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Recent Literature on Hydrometeorological Forecasting, p. 657

May 1957 No. 5

# METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY


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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

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SUBSCRIPTION RATE: $8.00 per year to members and non members. Single and back issues $2.00. Back volumes, $10 per volume.

This publication has been made possible through support and sponsorship extended by the Geophysics Research Directorate of the Air Force Cambridge Research Center, Air Research and Development Command, under Contract No. A. F. 19 (604)-2062.

# METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 8 MAY, 1957 No. 5

## SPECIAL FEATURE IN THIS ISSUE

Recent Literature on Hydrometeorological Forecasting

Compiled by
Geza Thuronyi

*(For complete table of contents see back cover)*

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Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 3 Joy Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

# FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ring to the attention of meteorologists current literature in their field and in related fields and provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, c., arranged according to the Universal Decimal Classification.

Part II of each issue comprises an annotated bibliography of important references on a ecial subject (usually arranged chronologically). No attempt is made to prepare exhaustive ibliographies; instead, the aim is to include a representative cross section of the various spects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

| | | | |
|---|---|---|---|
| . Atmos. Pollution | 2. Aerobiology | 3. Cloud Physics | 4. Hail |
| . Tornadoes | 6. Volcanic Dust | 7. Climat. Changes | 8. Thunderstorms |
| . Icing | 10. Acoust. Propagation | 11. Evaporation | |

Vol. II, 1951

| | | | |
|---|---|---|---|
| . Extended Forecast. | 2. Long Range Forecast. | 3. Soil Temp. | 4. Constants, etc. |
| . Clim. of Near East | 6. Clim. of Middle East | 7. Special Winds | 8. Radar Storm Detect. |
| . Condensation Trails | 10. Clim. of N.E. Africa | 11. Mountain Met. | |

Vol. III, 1952

| | | | |
|---|---|---|---|
| . Clim. of N.W. Africa | 2. Carbon Dioxide | 3. Clim. of Argentina, etc. | 4. Dew |
| . Objective Forecast. | 6. Stratus Forecast. | 7. Urban Climatology | 8. Clim. of C. Africa |
| . Visibility | 10. Glaze and Rime | 11. Free Air Turbulence | |

Vol. IV, 1953

| | | | |
|---|---|---|---|
| . Turbulence Theory | 2. Turbulent Diffusion | 3. Frost | 4. Clim. of Australia, etc |
| . High Level Winds | 6. Winds in Stratosphere | 7. Jet Stream | 8. Radiation Bioclim. |
| . Clim. of Pacific | 10. Auroras | 11. Sferics | |

Vol. V, 1954

| | | | |
|---|---|---|---|
| . Oceanog. Met. | 2. Clim. of S.E. Asia | 3. Auroral Physics | 4. Tropopause |
| . Balloons | 6. Numerical Forecast. | 7. Radiation Data | 8. Vertical Motion |
| . Clim. of Arctic | 10. Industrial Met. | 11. Wind Waves and Swell | |

Vol. VI, 1955

| | | |
|---|---|---|
| 1. Bibliog. of Bibliog. | 2. Texts & Monogr. Bibliogs. | 3. Storm Surges |
| 4. Ionospheric Prop. | 5. Photochem.—Upper Atmos. | 6. Cloud Physics |
| 7. Radar Cloud Physics | 8. Atmos. Nuclei (1841–1950) | 9. Atmos. Nuclei (1951–1955) |
| 0. Weather Modification | 11. Cooling Power | |

Vol. VII, 1956

| | | |
|---|---|---|
| 1. Synoptic Met.-Arctic | 2. Clim. of Enclosed Spaces | 3. Cosmic Rays (–1952) |
| 4. Cosmic Rays (1953–56) | 5. Atmos. Radioactivity | 6. Inversions |
| 7. Snow Micromet. | 8. Snow Micromet. (Suppl.) | 9. Tropical Cyclones |
| 0. Hurricane Damage | 11. Tropical Cyclone Theory | |

Bibliographies published this year are:

. **Solar Relations with Weather,** Vol. 8, No. 1, Jan. 1957
. **Night Airglow,** Vol. 8, No. 2, Feb. 1957
. **Forecasting of Special Elements,** Vol. 8, No. 3, March 1957
. **Forest Micrometeorology,** Vol. 8, No. 4, April 1957
. **Hydrometeorological Forecasting,** Vol. 8, No. 5, May 1957

Forthcoming bibliography will be:

. **Numerical Forecasting,** Vol. 8, No. 6, June 1957

Other bibliographies in preparation are:

| | |
|---|---|
| *Actinometers* | *Ozone* |
| *Albedo* | *Radio Astronomy* |
| *Human Bioclimatology* | *Singularities* |
| *Microwave Propagation* | *Synoptic Aerology* |

Part III contains a listing of reviews, translations, reprints, and the contents of important ublications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue omprises cumulative author, subject, geographical and journal indexes.

## EXPLANATIONS

**Location of material:** For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

**Library symbols** used frequently may be found in the following list:

| | |
|---|---|
| **DA:** | U. S. Dept. of Agriculture Library, Washington, D. C. |
| **DBS:** | U. S. Bureau of Standards Library, Washington, D. C. |
| **DGS:** | U. S. Geological Survey Library, Washington, D. C. |
| **DLC:** | Library of Congress, Washington, D. C. |
| **DN-HO:** | U. S. Navy Hydrographic Office Library, Suitland, Md. |
| **DSG:** | U. S. Army Medical Library, Washington, D. C. |
| **DSI:** | Smithsonian Institution Library, Washington, D. C. |
| **DWB:** | U. S. Weather Bureau Library, Washington, D. C. |
| **GB-MO:** | Great Britain, Meteorological Office Library, Harrow, England. |
| **MH-BH:** | Harvard University, Blue Hill Observatory Library, Milton, Mass. |

**Other symbols:**

| | |
|---|---|
| * | before an entry indicates a good data source. |
| † | before an entry indicates a good bibliography. |
| § | before an entry indicates a synoptic case history study accompanied by charts. |

**Geographic locations** are in the English form rather than the form used locally, for example, Moscow for Moskva.

**Titles of articles or monographs** are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

**Abbreviations:**

*Titles of periodicals* are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

*Meteorologische Rundschau*, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

# PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

## MAJOR GENERAL WORKS

### COLLECTED WORKS

8.5–1 551.509.3:551.589:519.24

*†Sellers, William David (*ed.*), **Studies in synoptic climatology.** Massachusetts Institute f Technology. Dept. of Meteorology, Contract N5ori-07883, Project NR082-102, Final Report, March 15, 1956. figs., tables, 44 refs. **DWB**—A number of studies of the synoptic-climatology type (made from 1952–55 by various members of the staff of the MIT, Dept. of Met.), are organized and assembled in this volume. The techniques are useful for either specification (where a prognostic chart is available) or prediction (where no prognostic chart is made), and for either 24-hour or 2, 3, 4 or 5 day predictions. The amount of information available in this type of analysis is far greater than that available in the earlier studies of this type (Jacobs, 1947), wherein only the prevailing flow type at a place (or for an area the size of Oregon, for instance) was used, conditions and developments upstream and even downstream are shown to add to the skill of the predictions. In the examples worked out in the chapter by MILLER and SELLERS on theory and application, a grid about the size of the U. S. was used. Surface pressures for 35 grid points in this area were calculated for Sept. 27, 1942, and orthogonal polynomials specifying the pressure pattern worked out for machine calculation of time series and eventual reconstruction of future pressure patterns. In Ch. 3, by FRIEDMAN, ROGERS, BEALS et al., the upper air circulation was incorporated, using a 115 point grid more nearly the size of N. America, and examples using 700 mb height data and eliminating the seasonal trend (for Jan. 8, 1950) are worked out in detail. Specification of precipitation variability on synoptic charts was also worked out for a number of Decembers for Indianapolis (Beals), and temperature variance for Dec. for Bismarck and Indianapolis in the same general way using linear regression analysis (Malone). In the paper by SELLERS a different approach was used to precipitation prediction for 24 hours for Boston, using sea level pressure, 700 mb height and 850 mb moisture fields for Jan. (1940–54). MILLER and MALONE used synoptic climatology to predict pressure patterns with example for Jan. 3–31, 1953. The principle involved is that there is more information in two charts showing circulation patterns 24-hours apart, or in other words a large number of time series of pressure at particular points (91 point grid), than in just one. Numerous observed and predicted charts for the month are shown for comparative purposes. Some success was achieved in predicting cyclonic developments by this crude method. *Subject Headings:* **1. Synoptic climatology studies 2. Objective forecasting studies 3. Extended forecasting by statistical methods 4. Statistical forecasting 5. Specification of weather from prognostic charts 6. Time-series in prediction 7. United States. I. Malone, Thomas F. II. Lorenz, Edward N. III. Kelley, Elizabeth A. IV. Lintner, Hermann V. Beals, Gordon A. VI. Miller, Robert G. VII. Rogers, Dan Terrance VIII. Massachusetts Institute of Technology. Dept. of Meteorology IX. Contract N5ori-07883 X. Project NR 082-102.**—*M.R.*

8.5–2 551.5(98):378.4

Russell, Pamela and Ballabon, Maurice B. (*eds.*), **Informal papers in Arctic meteorology: a report on a seminar in Arctic meteorology at Stanstead College, Quebec, July 25–Aug. 5, 1955.** McGill Univ. Arctic Meteorological Group, Contract AF 19(604)-1141, Scientific Report, No. 1, Dec. 15, 1955. 62 p. figs., tables, refs. at end of each paper. Contents: Godson, W. L., **Atmospheric radiation with applications to Polar regions,** p. 7–13. Godson, W. L., **Arctic jet streams and high-level turbulence,** p. 14–20. Godson, W. L., **Problems of Polar analysis,** p. 21–27. Godson, W. L., **International Geophysical Year: Canadian meteoro-**

**logical program,** p. 28–35. Hare, F. K., **Investigations in Arctic meteorology at McGi** p. 36–40. Keegan, T. J., **A method of synthesizing high-level wind climatology,** p. 41–4 Orvig, Svenn, **On the climatological importance of icecaps and glaciers,** p. 49–54. **Recor mendations for future research in Arctic meteorology,** p. 55–60. Also: **Supplement No. to Scientific Report No. 1.** pub. Montreal, June **1956.** 28 p. Contents: Avise, Herbert **Use of Fjortoft's graphical solution for the barotropic atmosphere,** p. 2–14. figs., eqs. Brun schweiler, Dieter H., **Frequency and typical characteristics of air mass,** p. 15. Burto Marcellus, W., **Analyses of T-3 ice fog data,** p. 16. Cole, Frederick J., **Problems of forecasti in Strategic Air Command,** p. 17. Goodale, E. E., **Resupply problems of Arctic Weath Stations,** p. 17. Hare, F. Kenneth, **Activities of McGill Arctic Meteorology Research Grou** p. 18. Hare, F. K., **The Miller-Malone statistical technique for specifying Arctic pressu surfaces,** p. 18. Humphrey, Paul, **Plans for U. S. Weather Bureau participation in Inte national Geophysical Year (as of July 1955),** p. 19–20. Keegan, Thomas J., **Climatology upper winds,** p. 21. Morgan, Millett, **IGY Program on Ionospheric Physics,** p. 21–22. Orvi Svenn, **Icecap climatology,** p. 23. Reed, Richard, **Arctic program of the University of Wash ington,** p. 23–24. Reed, Richard, **Arctic circulation problems,** p. 24–25. Toyli, Matthe **Thule weather,** p. 26. Wilson, Horace P., **Activities of the Arctic forecast Team, Edmonto** p. 26–28. **DWB**—At this informal conference, 15 one-hour talks were given (as listed above Each talk was followed by a 2-hour discussion among the 30-odd participants of the semina Seven of the papers are given in full and will be abstracted separately in *MAB*. The oth papers and discussions are summarized and recommendations for future research in synopt meteorology, climatology, radiation and other physical processes, and a list of participants a their affiliations, etc. are included. In the Supplement, only abstracts and summaries discussions are given for papers other than that by H. J. Avise, although some of the abstrac are quite long and thorough. *Subject Headings;* **1. Arctic meteorology seminars 2. Arct meteorological research.**—*M.R.*

8.5–3 551.511:551.521:551.524:523.

Massey, H. S. W. et al., **A discussion on radiative balance in the atmosphere under th leadership of H. S. W. Massey, F.R.S.** Contents: Massey, H. S. W., **Introductory remark** p. 145–148; Möller, F., **The pattern of radiative heating and cooling in the troposphere an lower stratosphere,** p. 148–156; Curtis, A. R., **The computation of radiative heating rates i the atmosphere,** p. 156–159; Migeotte, M., **High-resolution spectroscopy of minor atmospher constituents,** p. 159–160; Robinson, G. D., **The use of surface observations to estimate th local energy balance of the atmosphere,** p. 160–171; Jones, F. E. and Roberts, V., **Sola infra-red spectroscopy from high-altitude aircraft,** p. 171–175; Brewer, A. W. an Houghton, J. T., **Some measurements of the flux of infra-red radiation in the atmospher** p. 175–186; Dobson, B. M. B., **Origin and distribution of polyatomic molecules in the a mosphere,** p. 187–193; Curtis, A. R. and Goody, R. M., **Thermal radiation in the upper a mosphere,** p. 193–206; Bates, D. R., **The thermosphere,** p. 206–211; Boyd, R. L. F., **Stud of solar radiation at high altitudes using rocket-borne instruments,** p. 211–216; Ditchburn R. W., **Absorption of ultra-violet radiation by the atmospheric gases,** p. 216–226. *Roy Society of London, Proceedings, Ser. A*, 236(1205):145–226, Aug. 2, **1956.** figs., tables, nume ous refs., eqs. **DWB**—In a short introduction Massey sets out the difficulties of the subjec and the need for synoptic measurements up to great heights. The broad features of the radia tion balance to and from space, at the earth's surface and in the atmosphere are summed up Möller summarizes the vertical distributions to 16 km of temperature and water vapor i various latitudes and cooling rates by water vapor (without clouds). Effect of clouds next considered, for a cyclonic and a high pressure area over Germany. From these the mea radiation flux divergence over Europe, surface −400 mb, is computed for Jan. 1954, but th cannot be simply related to the pressure pattern. Curtis describes a numerical method approximating the heating rate of the atmosphere. Migeotte describes a number of molecula bands in the absorption spectrum of the earth's atmosphere at Jungfraujoch. Robinso estimates the net radiation entering or leaving the earth's atmosphere and surface durin May 1953–April 1954, and in winter and summer. The heat liberated by phase changes $H_2O$ and heat conduction to the ground are also estimated. The deduced heating is compare with latitude means derived from other studies. New estimates are made of the local albed

or all types of radiation, and of the photometric albedo. An appendix deals with the value of the solar constant. JONES and ROBERTS describe identifications of rare constituents with an air-borne spectrometer. BREWER and HOUGHTON set out results of 9 aircraft ascents in which the upward and downward fluxes of infrared radiation were measured, and compare the results with calculations from the radiation charts of ELSASSER and YAMAMOTO. The importance of clouds in the radiative pattern is such that incomplete knowledge of cloud structure is the main limiting factor in calculating atmospheric radiation. It is concluded that radiative cooling continues into the lower stratosphere. DOBSON discusses the distribution of water vapor and ozone relative to the tropopause and in the stratosphere, and sketches the paths of air entering or leaving the stratosphere and upward or downward diffusion of water vapor and ozone. CURTIS and GOODY describe atmospheric radiation calculations at low pressures. An equation of transfer for a vibration-rotation band leads to an equation of heating rate due to the band in a plane-stratified atmosphere. The departure from a Boltzmann distribution becomes serious above 75 km. BATES, from the influence of thermal conductivity on temperature, infers that the temperature gradient falls off rapidly above the base of the $F_1$ layer. A temperature of 1500°K in the exosphere cannot be reconciled with 300°K at 250 km. BOYD describes studies of solar spectrum in the upper atmosphere by various methods, and summarizes results in America. DITCHBURN discusses order of magnitude of absorption coefficients for photoionization and photodissociation. Measurements and calculations of $N_2$, $O_2$, N, O, $O_3$ are summarized and depths of penetration into the model atmosphere of the Rocket Panel are given. Absorption coefficients of a number of minor coefficients are listed. A list of references to experiments and calculations is given, classified under gases. *Subject Headings:* **1. Radiation balance 2. Radiation flux 3. Solar spectrum.** —*C.E.P.B.*

8.5–4 55

**The dynamic North.** Wash., D. C., Issued by the Technical Assistant to Chief of Naval Operations for Polar Projects, **1956.** Loose-leaf. 2 Vol. Binders with side guide dividers for various articles to be inserted as issued. **DWB**—This uniformly edited loose-leaf compendium consists of 29 articles on various phases of the Arctic, arranged in 2 volumes. Subjects include Geophysics, Meteorology, Climate, Oceanography, Sea Ice, Glaciers, Permafrost, Daylight and Darkness, Aurora, Geomagnetism, Seismology, Energy Transport, Hydrometeorology, Warming of Arctic, Surveying Construction, Strength of Ice Covers, Cold Storage, etc. Authors and titles of the separate articles will be found in Pt. 3 on p. 688. This is essentially the material planned for Steffanson's **Encyclopedia Arctica** (*see* 5I–184, Sept. 1954, *MAB*), but supplemented and revised. *Subject Headings:* **1. Arctic geophysics 2. Arctic Encyclopedia 3. Arctic climatology. I. U. S. Office of Naval Operations.**—*M.R.*

8.5–5 551.515.2:551.501.81:06

Weather Radar Conference, Asbury Park, N. J., Sept. 12–15, 1955, **Proceedings of Conference (and of the) 139th National Meeting of the American Meteorological Society.** Ft. Monmouth, N. J., Signal Corps Engineering Labs., Oct. 17, **1956.** 334 p. figs. (incl. photos), eqs. bibliogs. at end of most chapters. Most of papers presented in full or in abstract form. **DWB**—All papers presented at the Fifth Weather Radar Conference (Sept. 12–15, 1955) which was held at Asbury Park, N. J., in conjunction with the 139th National Meeting of the American Meteorological Society, as received up to Oct. 12, 1956, are included exactly as provided (by photo offset) regardless of length or subject matter (some were on hurricanes, instrumentation and other subjects not connected with Weather Radar). Contents of this volume are listed on p. 699 of Pt. III of this issue. The pre-publication volume contained short versions of many of these papers, and abstracts of others. The 5 sessions were devoted to: 1) invited papers, 2) hurricanes, 3) atmospheric variability, 4) storm structure, and 5) operational experience with weather radar and sferics equipment. *Subject Headings:* **1. Weather Radar Conference 2. Collected works 3. Asbury Park, N. J. I. American Meteorological Society II. U. S. Signal Corps Engineering Labs., Ft. Monmouth, N. J.**—*M.R.*

## TEXTBOOKS

*See also:* **Thermal balance of earth's surface** (Budyko), 8.5–20; **Met. for mariners** (Gt. Brit. Met. Off.), 8.5–82.

8.5–6 551.5(26)(02)

Halpine, Charles Greham and Taylor, Halton Hagen, **A mariner's meteorology.** New York, Van Nostrand Co., **1956.** 371 p. numerous figs., photos, and tables. **DWB**—This is a simple but up-to-date text on marine meteorology similar to **A Pilot's Meteorology** by the senior author. The 13 chapters include: Atmosphere, Elements and their measurement; Cloud types and obstructions to vision; Temperature and thermal processes; Circulation and winds; Air masses, Fronts and disturbances; Weather reports; Weather maps, Weather forecasts, Climatology, Oceanography and Weather at war. The last chapter contains an extensive discussion of radioactive fallout, and the appendices contain a glossary, charts (climatic and meteorological), etc. The chapter on air masses, etc., contains an extensive discussion of tropical cyclones and their tracking by radar (p. 178–191). Review by C. E. N. Frankcom and R. F. M. Hay in the *Marine Observer*, 26(174):232–234, Oct. **1956.** *Subject Headings:* **1. Marine meteorology textbooks 2. Radioactive fallout.**—*M.R.*

8.5–7 551.508:53.08(02)

Kachurin, Lev Grigor'evich, **Rukovodstvo k laboratornym rabotam po meteorologii.** [Handbook for laboratory work in meteorology.] Leningrad, Gidromet. Izdat., **1955.** 423 p. 166 figs., tables, refs at end of each ch., eqs. **DLC**—This is a unique textbook designed for students in advanced and intermediate courses in meteorology in universities or training courses, and for any specialist who might need such information. The technical details regarding accuracy of measurements, calibration and elimination of errors, mechanical and electrical clockworks, sensitive or rapid response indicators, measurements of temperature, humidity, pressure, wind, automatic or distant recording equipment (4 types), radiation, precipitation and evaporation, visibility, atmospheric electricity, thermal balance and cloud physics, elements in the laboratory are profusely illustrated and annotated, and theory presented where pertinent. The Soviet automatic weather station DMSH-49 is discussed in detail and illustrated on p. 209–14. *Subject Headings:* **1. Meteorological instruments 2. Laboratory equipment 3. Instrument textbooks. I. Tret'iakov, V. D. II. Petrov, N. A. III. Gavrilov, V. A. IV. Goreleĭchenko, A. V. V. Imianitov, I. M.**—*M.R.*

8.5–8 551.521.1(02)

*†Kondrat'ev, K. Ia., **Luchistaia energiia solntsa.** [Radiant energy of the sun.] Ed. by P. N. Tverskoi. Leningrad, Gidrometizdat., **1954.** 599 p. 267 figs., 220 tables, 507 refs. **DLC**—The first part of this comprehensive book on solar radiation follows the lines of KALITIN's classic text of 1938, though incorporating findings through 1953. The last part of the book is completely original and based almost entirely on recent data and literature from Russia and abroad. The systematically arranged chapters cover: 1) General concepts of radiation; 2) Theory of actinometry of short (and visible) wave radiation in the atmosphere; 3) Extinction in atmosphere due to scattering; 4) Atmospheric extinction due to absorption; 5) General extinction, transmissivity, effects of clouds, geographical variation; 6) Spectral distribution of solar and transmitted energy; 7) Flux and total heat of direct solar radiation; 8) Reflected radiation; 9) Albedo of surface of earth and clouds; 10) Global radiation; 11) Insolation under special conditions (vegetation, forests, water, snow, ice); 12) Applications. The book is profusely illustrated with graphs and the text supported by selected tabular data, theory and extensive references on every subject (arranged by chapters). Although a good percent of the reference material is from foreign sources, the tables have mostly been given in Cyrillic (Russian). The subject index gives a good idea of the wide variety of instrumental, observational and theoretical subjects covered. *Subject Headings:* **1. Solar radiation textbooks 2. Solar radiation bibliographies 3. Albedo.**—*M.R.*

8.5–9 551.579:551.49(02)

Leĭvikov, Moiseĭ L'vovich, **Meteorologiia, gidrologiia i gidrometriia.** [Meteorology, hydrology and hydrometry.] 2d rev. ed. Moscow, Gos. Izd-vo Sel'khoz. Lit-ry, **1955.**

510 p. 213 figs. (some fold), 46 tables, 21 refs., 165 eqs. **DLC**—This second edition of the author's text (for use in hydrology courses for agricultural and hydrological engineers) contains about 40 pages more material and 60 more illustrations (and a few bibliographic references) than were found in the first edition (1949). Corrections and amplifications are distributed throughout the book. The main emphasis is on instruments, observations and measurements on various small and large basins of the U.S.S.R. and in the quantitative forecasting of streamflow, water supply and floods. There is a 40-page chapter on lakes, ponds and bogs, their hydrology and water economy. The material on meteorology and forecasting weather is brief and conventional. The section on evaporation, however, is quite thorough. Numerous charts show the runoff and other hydrometeorological factors (evaporation, snow cover, precipitation, etc.), both annual and seasonal, in European USSR and in the whole Union. (For 1st ed., *see* 2.6–113, June 1951, *MAB.*) *Subject Headings:* **1. Hydrometeorology 2. Hydrology textbooks 3. U.S.S.R.**—*M.R.*

8.5–10 532.517.4:551.511.6

Townsend, A. A., **The structure of turbulent shear flow.** Cambridge, Univ. Press, **1956.** 315 p. figs., tables, refs., eqs. **DWB**—This book attempts to develop a consistent view of the nature of turbulent flow. Ch. 1, Introduction (theoretical basis). Ch. 2, The equations of motion in shear flow. Ch. 3, Flows without appreciable variation of mean velocity. Ch. 4, Uniform distortion of homogeneous turbulence. Ch. 5, Free turbulence: unrestricted shear flow. Ch. 6, Free turbulence: motion of the large eddies. Ch. 7, The turbulent wake. Ch. 8, Turbulent jets. Ch. 9, Turbulent flow in pipes and channels. Ch. 10, Boundary-layer flow without pressure gradient. Ch. 11, Boundary-layer flow in a pressure gradient. Ch. 12, Shear flow between rotating cylinders. Review by F. Pasquill in *Meteorological Magazine*, London, 85(1014):380–381, Dec. **1956.** *Subject Headings:* **1. Turbulence theory 2. Turbulent flow.**—*C.E.P.B.*

## POPULAR SCIENCE BOOKS

8.5–11 551.594:(023)

Stekol'nikov, Il'ia Samuilovich, **Molniia i grom.** [Lightning and thunder.] 3d ed. rev. Moscow, Voennoe Izdat. Ministerstva Oborony Soiuza SSR, **1954.** 95 p. 41 illus., 5 refs. *Nauchno-Populiarnaia Biblioteka Soldata i Matrosa.* **DLC**—A popular pamphlet covering the basic scientific and practical aspects of atmospheric electricity, lightning, thunder, auroras, ball lightning and charges, and the protection of houses, men, structures or transmission lines against lightning. Schematic diagrams are used throughout. *Subject Headings:* **1. Lightning 2. Atmospheric electricity.**—*M.R.*

8.5–12 551.5:91.04(268)

**V tsentre Arktiki.** [In the center of the Arctic.] Photography by IA. Riumkina. Text by I. V. Dolgopolov. Ed. by Vasiliĭ Fedorovich Burkhanov. Moscow, Izdat. Pravda, **1955.** 81 p. 34×24 cm. Mostly photos (some col.) with text. **DLC**—A large colored album for popular use (40,000 copies) vividly depicting life and activities on the Soviet drifting station SP-3 (Severnyĭ Polius-3) which drifted across the pole from April 9, 1954 to March 25, 1955. A map of the Central Arctic shows limits of the ice pack, the routes of the "Fram," "Sedov," "Jeannete," SP-1 (1937–8), SP-2 (1950–1), SP-3 and SP-4 (April 1954–March 1955). The scores of excellent photos show many meteorological and oceanographic observational activities in winter (dark) and summer (daylight), and the meteorologists and hydrologists who were in charge or assisted in these scientific observations. Reading thermometers, following balloons with theodolites, filling and launching radiosondes and lowering bathythermographs into the ocean through the ice are among the events shown. Text describes Soviet Arctic expeditions to 1955. *Subject Headings:* **1. Arctic expeditions 2. Soviet drifting expedition SP-3 3. Arctic observations 4. Soviet meteorologists 5. Arctic. I. Riumkina, IA. II. Burkhanov, Vasilii F.** (*ed.*) **III. Dolgopolov, I. V.**—*M.R.*

8.5–13 551.582(988):016 551.311.1(988)

*†Ignat'ev, Grigoriĭ Mikhaĭlovich, **Grenlandiia.** [Greenland.] Moscow, Gosud. Izdat. Geograficheskoĭ Lit., **1956.** 247 p. chart (fold.), numerous figs. (incl. photos), 154 refs.

**DWB**—Among chapters on the exploration, geology, geography, ocean currents, ice, glaciers, vegetation, etc. of Greenland, a chapter on climate (p. 89–118) and one on glaciers (p. 119–151) summarize existing knowledge of general circulation, frontal zones, temperature gradients over ice, cyclone and anticyclone movements, local winds, temperature (table gives mean monthly values from 12 coastal station and 4 expeditions to ice cap), precipitation, cloudiness, visibility, snow line, glacier balance (ablation and accumulation), glacier temperature and movement, structure of ice, etc. *Subject Headings:* **1. Climate of Greenland 2. Glaciology of Greenland 3. Bibliography of Greenland climate 4. Greenland.**—*M.R.*

8.5–14 551.501.9(023)

Yates, Raymond Francis, **The weather for a hobby; a guide to the construction and use of weather instruments intended for amateurs.** Rev. ed. New York, Dodd, Mead and Co., **1956.** 181 p. 52 figs., photos. **DLC**—This revised edition of a popular book on weather, weather instruments and observation differs from the first edition (pub. 1946) in having an extra chapter on the Jet Stream and how it varies, controls weather and steers hurricanes. The main part of the book brings out unusual facts about upper atmosphere observations, applications of meteorology to industry, air masses and fronts, home experiments to demonstrate atmospheric phenomena, to measure cloud heights and movements, surface wind speed (weather vanes and anemometers made from parts of automobiles and automatic recorders made from simple equipment), electrical thermometers, barometers, rain gages and psychrometers and, finally, weather maps and forecasting. *Subject Headings:* **1. Amateur weather stations 2. Elementary meteorology 3. Popular meteorology books.**—*M.R.*

## MONOGRAPHS AND COMPREHENSIVE PAPERS

8.5–15 551.501.81

†Atlas, David; Plank, V. G.; Paulsen, W. H. et al., **Weather effects on radar.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics*, No. 23, Dec. **1952** 43+10 p. figs., tables, eqs., bibliog. p. 41–43. Append. A: Atlas, David P., **Oxygen absorption,** p. 40. Append. B: Marshall, John Stewart and Hitschfeld, Walter, **Calculated sensitivity of airborne weather radars.** 10 p. Feb. **1953.** figs., 5 refs., eqs. **DWB**—The theory of refractive index, of microwave properties of spherical particles, rain, snow, clouds and the atmosphere is reviewed on the basis of previous work by many authors, and the direction future research should take along these lines is discussed. In Pt. 2, atmospheric attenuation of the short microwaves in various conditions is reviewed along with many case histories. Bibliography lists 50 articles (1946–53) on the above subjects. *Subject Headings:* **1. Radar wave attenuation 2. Air-borne weather radar 3. Tropospheric propagation. I. Chmela, A. C. II. East, T. W. R. III. Gunn, Kenrick L. S.**—*M.R.*

8.5–16 535.341:533

†Breene, R. G., Jr., **The shift and shape of spectral lines.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 41, Sept. **1955.** 336 p. tables, numerous figs., 215 refs., eqs. **DWB, DLC**—Most of the theoretical work on the problem of spectral line broadening, shape and shift, since 1895 and including 1953, is reviewed in orderly manner, with due credit given to the authors of the >200 papers and books cited. The early history of the theory of line broadening (1895–1915), spectral line positions, electrodynamics, Stark theory of broadening, statistical theory of broadening and shift, interruption theory, resonance or self-broadening, molecular broadening (the broadening of polyatomic molecular lines) and the broadening and shift of high series members constitute the subject matter of the 9 major chapters, each of which is subdivided into 5–26 sub-sections and 9 appendices added along with the extensive list of references. In all, this is a formidable, though lucid, presentation of the complicated theory of the spectroscopy of gases, which is so important in the study of chemical composition of the atmosphere and energy changes associated with the chemical changes in solar radiation fields. *Subject Headings:* **1. Spectral line broadening 2. Spectral line shift 3. Gaseous spectra.**—*M.R.*

8.5–17 551.46:535

Cox, Charles and Munk, Walter, **Slopes of the sea surface deduced from photographs of sun glitter.** *California. Univ. Scripps Institution of Oceanography, La Jolla, Bulletin,* 6(9):401–488, **1956;** *Contributions, n.s.*, No. 589. 27 figs., 3 plates, 3 tables, 34 refs., numerous eqs. **DWB, DLC**—This is a complete and systematic monographic treatment of the subject covered by the authors in an abbreviated form in 1954 and 1955 (*see* 7.4–45, and 7.4–44, April 1956, *MAB*) and in extended form in progress reports issued during 1952, 1953 and 1954 (*see* 5K–134, Nov. 1954, *MAB*). The conclusions are based on data obtained during Aug.–Sept. 1951 from a B-17G airplane flying over waters near the island of Maui (Hawaii). The shape (width) of the sun's glitter reveals, when carefully analyzed, the statistics of the slope of the waves and taken together with surface wind, cloudiness and other meteorological and astronomical data gives useful information on albedo, transmission of light into the sea, etc Oil and wind slicks are also treated. Average values of albedo of sea have been too high by about 20% owing to neglecting reduction of albedo due to roughening of water by wind. The monograph discusses in Chap. 2 the aerial and sea observations, 3) geometry of reflection, 4) surface radiance, 5) background radiation, 6) statistics of slope distribution, 7 and 8) evaluation methods for coefficients, 9) mean square slopes, skewness and peakedness, 10) experimental errors and fluctuating wind effects, 11) summary, 12) waves in one dimension, 13) waves in 2 dimensions, 14) beam width in trade wind sea, 15) Darbyshire and Neumann spectra, 16) effect of slicks, 17) glitter as seen from under the sea, 18) reflection of direct and 19) reflection of diffused sunlight from a rough sea, and 20) visibility of slicks. The work is full of theory and also useful nomograms and scattergrams. *Subject Headings:* **1. Slope of ocean waves 2. Sun's glitter photographs 3. Albedo of sea surface 4. Wind slicks 5. Oil slicks 6. Maui, Hawaii.**—*M.R.*

8.5–18 551.515.3(764)

Glaser, Arnold H.; Elliott, William P.; Stephenson, Henson K. et al., **Tornado damage studies spring 1956.** Texas. Agricultural and Mechanical College. Dept. of Oceanography, Contract Cwb 8696, Project 129, (Unnumbered report), July **1956.** unpaged. numerous photos and figs., refs. **DWB**—Detailed photographic and ground surveys or interviews were conducted shortly after tornadoes in Gustine, Blum, Itasca, Temple and Bryan, Texas (Feb. 17, March 21, and April 5, 1956) in order to determine from the damage the respective path lengths, course, width, horizontal velocity distribution, direction of rotation, vertical velocities, pressure distribution, attending phenomena, relation of path to terrain and to radar echoes, efficiency of tornado warning systems and public reaction to warnings. Evidence was found of a central core of high velocities surrounded by an area of decreasing speed with a sharp discontinuity between; strong inflow at the surface, cyclonic rotation in all but the Gustine-Blum tornado which gave strong evidence of anticyclonic rotation; little topographic effect, no relation to thermal sources; good correspondence with radar echoes (hooks, holes or split echoes), good results from radar detection and warnings (no lives lost or serious injuries in spite of great property damage). Numerous and excellent photographs as well as diagrams and tabulations of interviews support narrative text. *Subject Headings:* **1. Tornado damage studies 2. Tornado photographs 3. Tornado dynamics. I. Jones, Truman R., Jr. II. Chancey, Oscar J.**—*M.R.*

8.5–19 551.511.33:551.52 551.582.3(26)

**Atlas teplovogo balansa.** [Atlas of thermal balance.] Ed. by M. I. Budyko. Leningrad, **1955.** 41 p. 41 cm×39 cm. Almost entirely charts (in color). At head of t-p: Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby pri Sovete Ministrov Soiuza SSSR, Glavnaia Geofizicheskaia Observatoriia im A. I. Voeĭkova. **DWB.** Also: Budyko, M. I. and Efimova, N. A., **O tochnosti kart sostavliaiushchikh teplovogo balansa.** [Accuracy of charts of the components of thermal balance.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* 50(112):111–119, **1955.** 4 figs., table, 13 refs. **DAWS**—The first work is a compilation of monthly and annual charts (in color) of (A) total solar radiation, (B) radiation balance of the earth's surface (continents and oceans), (C) loss of heat by evaporation (oceans), (D) turbulent heat exchange between sea and atmosphere, (E) evaporation from oceans. An annual chart of heat lost or gained by ocean surface due to currents (advective heat ex-

change) is also included. An ample explanation or summary precedes each of the 6 major sections. The charts are nicely drawn in attractive colors and on a convenient world projection which allows data to be presented from 70°N to 63°S, charts which embrace only the oceanic areas (i.e., evaporative heat loss and turbulent heat exchange) are supplemented by a page containing graphs of the annual regime of the element for 12 places on continents in different parts of the world. All heat or radiation charts use g cal/cm² year (or month), and evaporation in mm/year (or month). The methods of calculation are described by M. I. Budyko et al. in their **Teplovoĭ balans poverkhnosti zemli**, (*see* 7H 61, Aug. 1956, *MAB*), and in book by M. I. Budyko, 1956 (*see* 8.5–20, *this issue*). In the second article, the techniques for evaluating the accuracy of existing methods for calculating the constituents of radiation and heat balance at the earth's surface are outlined briefly and the accuracy of the individual constitutents of the radiation and heat balance used in constructing climatologic maps is determined. The accuracy of measurement of total radiation, radiation balance, of heat loss by evaporation etc. are discussed. Data on radiation balance for physiographically defined regions such as tundra, desert, etc. are presented. *Subject Headings:* **1. Heat balance atlases 2. Radiation balance charts 3. Evaporation from seas 4. Marine climatic atlases 5. Radiation measurement accuracy. I. Leningrad. Glavnaia Geofizheskaia Observatoriia.**—*M.R., I.L.D.*

8.5–20 551.511.33:016(02)

†Budyko, M. I., **Teplovoĭ balans zemnoĭ poverkhnosti.** [Thermal balance of the earth's surface.] Leningrad, Gidrometizdat., **1956.** 254 p. 72 figs., 19 tables, 344 refs., 150 eqs. **DWB**—The basic knowledge of the heat balance between the earth and the atmosphere, as gained from over 340 articles and monographs cited in the bibliography (31 by the author himself during period 1946–1955), and not neglecting western sources (94 refs. cited from western and 250 from Russian authors), is summarized systematically. The 6 chapters (16 paragraphs) deal with I. Introduction, 1) equations of the heat balance, 2) general review of research on heat balance; II. Calculations, 3) radiation balance, 4) turbulent exchange between soil, ice or sea and atmosphere, 5) evaporative heat loss, 6) accuracy of determinations; III. Geographical distribution of, 7) radiation balance, 8) heat balance, 9) annual and diurnal regime; IV. Heat balance and energy, considerations involved in physico-geographic processes, 10) relation between heat and water balance, 11) heat balance and geographic zones, 12) and plant cover; V. Heat balance and meteorological amelioration measures, 13) shelter belts and forests, 14) irrigation; VI. Heat and water balance of the earth, 15) heat balance, 16) water balance and hydrologic cycle. The basic equations are included but on the whole the treatment is empirical (descriptive or graphical) rather than theoretical. The excellent "Atlas teplovogo balansa" edited by the author and published by the Glav. Geofiz. Observ. of which the author is director, is a comparison piéce (or vice versa) to this handy monograph. Applications to agriculture, engineering, hydrology, oceanography, are obvious. The book is intended for students or specialists in meteorology, climatology, hydrology and oceanography and for other scientists, technicians, or students wishing to learn more about this fundamental subject, either from a continental or global perspective, or from the micro-meteorological point of view. *Subject Headings:* **1. Heat balance of the earth's surface 2. Energy exchange sea-atmosphere 3. Energy exchange earth-atmosphere 4. Heat balance 5. Heat balance bibliographies 6. Textbooks.**—*M.R.*

8.5–21 551.506.7(43)

*Holzapfel, Rupert, **Ergebnisse aerologischer Beobachtungen in Deutschland, Teil 1, 2, 3.** [Results of aerological observations in Germany, Pt. 1, 2, 3.] *Germany. Deutscher Wetterdienst, Berichte*, 4(27), **1956.** 101 p. mostly tables. **DWB, DLC**—Tables are: 1) for each year, scalar values of monthly and annual mean upper air winds for Berlin and Munich (1947–55), 2) seasonal frequencies of mean winds aloft for Berlin and Munich (1947–53), and 3) mean monthly, seasonal, semi-annual and annual upper air temperature, pressure and height of standard isobaric surfaces for Berlin, Erlangen and Munich. In Part 1 values obtained from all observations are given to 30 km, and from all observations reaching 10 km for each level to 10 km. Part 2 gives data which may be used to construct Baillie type wind roses, and in addition mean air motion and constancy for levels up to 16 km. *Subject Headings:* **1. Upper**

**air wind data summaries 2. Upper air temperature data summaries 3. Berlin, Germany 4. Munich, Germany 5. Erlangen, Germany.**—*M.R.*

8.5–22 551.510.53

†Kaplan, J.; Schilling, G. F. and Kallmann, H. K., **Methods and results of upper atmosphere research.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 43, Nov. **1955.** 162 p. numerous figs. and tables, refs. at end of each chapter, numerous eqs. **DLC**—Gives latest information on direct and indirect knowledge of structure of upper atmosphere, based on gun shell explosions, rocket observations, high level balloons, noctilucent clouds, meteor observations, night sky emissions, sound propagation, radio wave propagation, searchlight measurements and theoretical studies. (*See* 6.9–9 Sept. 1955, *MAB*, *for same report from different source.*) *Subject Headings:* **1. Upper atmosphere structure 2. Upper atmosphere data 3. Noctilucent clouds.**—*M.R.*

8.5–23 551.582(711,712)(02)

*Kendrew, Wilfred George and Kerr, D., **The climate of British Columbia and the Yukon territory.** Ottawa, Edmond Cloutier, **1955.** 222 p. 54 figs., 8 photos., 101 tables. This volume comprises one of the few comprehensive climatologies, treating one or two single Provinces or states, published in recent years. The original work was done as a series of articles by Donald Kerr of the Univ. of British Columbia, but the articles have been assembled, revised, enlarged and edited by the well known author of the **Climates of the Continents, Climatology and the Climate of Central Canada** (*see* 6.4-1, April 1955 and 8.1–14, Jan. 1957, *MAB*). Eventually the series on Canada will cover the entire Dominion. In Pt. I, Southern British Columbia, separate chapters cover 1. general—regions, topography, stations; 2. air masses, fronts, pressure systems; 3. winds; 4. temperature, and humidity and frost; 5. cloud, sunshine; 6. precipitation; 7. visibility and ceilings. In Pt. II, Ch. 8–9 do the same for Northern British Columbia and Yukon Territory. The work contains nicely prepared, generalized, isohyetal charts, and mean pressure charts, vivid photographic illustrations, many carefully selected data tables and an ample amount of general tabular material. All that is lacking is a subject index, but the outline is so clear and well balanced that the various subjects (e.g., thunderstorm frequency, hail, fog, snowfall, sunshine, freezing rain, mixing ratio, etc.) are not difficult to locate. The 2 appendices consist of general data tables for 31 stations in S. British Columbia and 13 stations in N. British Columbia and Yukon Territory, respectively. *Subject Headings:* **1. Climate of British Columbia 2. Climate of Yukon Territory 3. British Columbia 4. Yukon Territory.**—*M.R.*

8.5–24 551.551:551.557

†Lake, Herman, **Meteorological analysis of clear air turbulence: a report on the U. S. Synoptic High-Altitude Gust Program.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 47, Feb. **1956.** 63 p. 9 figs., 15 tables, 48 refs. **DWB, DLC**—An intensive and detailed study of 598 pilots' reports of the occurrence or nonoccurrence of high-altitude turbulence at 30–39,000 feet collected during the U. S. Synoptic High Altitude Gust Program held 18–21 March 1953 was made. The objective of the analysis of the appropriate meteorological variables, upper air features and the aircraft turbulence reports by means of standard and nonstandard synoptic charts was to determine the usefulness of the statistical relationships between the atmospheric processes and clear air turbulence. The variables used were the wind speed, wind direction, wind shear, thermal stability and the Richardson Number. The synoptic features that were studied included the distance from the tropopause, tropopause breaks, and jet stream axis. Present indications are that the turbulence experienced by pilots is a result of the influences of pertinent meso-scale atmospheric motions, the plane's characteristics, such as its speed and altitude, as well as the sensory reactions of the pilot. Statistical testing indicated that there is a slight possibility that the intensity of turbulence is dependent upon both the magnitude and sign of (1) the vertical gradient of the horizontal kinetic energy, and (2) the product of the horizontal wind speed and vertical gradient of the wind shear. *Subject Headings:* **1. Clear air turbulence 2. High altitude turbulence 3. Upper air analysis 4. U. S. Synoptic High-Altitude Gust Program.**—*Author's abstract.*

8.5–25 551.551.2

Panofsky, H. A. and Van der Hoven, Isaac, **Structure of small scale and middle scale turbulence at Brookhaven.** Pennsylvania. State. Univ. Mineral Industries Experiment Station. Dept. of Meteorology, Contract AF 19(604)-1027, Scientific Report, No. 1, March 1, **1956.** 77 p. 34 figs., 7 tables, 10 refs., 7 eqs. **DWB**—Numerous vertical and horizontal wind component spectra are presented for high and low radiation conditions (micrometeorological) for all conditions (mesometeorological) for 23, 46 and 91 m height, (Brookhaven, N. Y. Tower, May 5, 1954), supplemented by 1953-55 balloon and airplane observations to show difference between Lagrangian and Eulerian power spectra. It is shown that at greater heights the spectrum shifts toward lower frequencies because of greater importance of convective turbulence over mechanical turbulence; that the spectra of horizontal turbulence shifts little with height, the $-5/3$ law holds for horizontal components; and that there is a minimum of occurrences at frequencies of about 1 hr. Stresses are greatest at 46 m under unstable, and at 23 m under stable conditions. Energy and stress can be estimated from wind speed and radiation. *Subject Headings:* **1. Turbulence spectrum 2. Brookhaven, N. Y. I. Pennsylvania State Univ. Mineral Industries Experiment Station. Dept. of Meteorology.** —*M.R.*

## MANUALS, ATLASES AND HANDBOOKS

*See also:* **Atlas of thermal balance,** 8.5–19.

8.5–26 551.46:016(02)

†*Bruns, Erich, **Handbuch der Wellen der Meere und Ozeane.** [Handbook of sea and ocean waves.] 2d ed. Berlin, Deutscher Verlag der Wissenschaften, **1955.** 255 p. 150 figs. (incl. photos), 99 tables, 201 refs., 179 eqs. **DLC**—Only a few changes have been made in the second edition over the first edition (which was published earlier by the Seehydrographischer Dienst der Deutschen Demokratischen Republic Hydrometeorologisches Institut. The "handbook" is a nicely printed and profusely illustrated summary of the current knowledge, as obtained from Russian, German, French, British and American literature, of waves, wave observation or measurement, and wave forecasting after a rather brief theoretical section on origin, development, motion, elements and energy of waves and surf, a complete coverage of 30 types of wave recording equipment and a score of wave force measuring equipment. Wave data for the 10 seas and oceans of the world are presented in 10 separate chapters (Pt. III). Pt. IV covers results of wave force measurements on coasts of 4 of the seas or oceans; Pt. V, the calculation of wave elements when no data or insufficient data are available, using formulas of several dozen authors, and Pt. VI, wave forecasts by SVERDRUP and MUNK's method and by other methods. A thorough bibliography, heavily weighted with Russian source material, an author and a subject index, and numerous nomograms and charts add to the value of the book. *Subject Headings:* **1. Ocean wave handbooks 2. Ocean wave forecasting 3. Ocean wave recording equipment 4. Ocean wave data 5. Ocean wave bibliography.**—*M.R.*

8.5–27 551.510.4(02)

†Cadle, R. D. (*Stanford Res. Inst., Stanford, Calif.*), **Particle size determination.** New York, Interscience Publishers, Inc., **1955.** 303 p. numerous figs. (incl. photos), tables, refs. at end of each chapter, numerous eqs. **DWB**—The many methods of particle sampling and analysis in use through 1954 are treated systematically in this handbook. Optical microscopy, electrical microscopy, sieve analysis, sedimentation elutriation, surface area measurements, optical methods (coronas, scattering, polarization, etc.), x-ray measurements, sonic electrostatic and diffusion methods, etc. are discussed. Treatment of data is also considered. Applications to meteorology are so numerous it is possible to mention only a few: atmospheric optics, turbidity, cloud physics, visibility, atmospheric pollution, dust, sand and fallout. However, such applications are only stressed to show that the method of sampling or analysis depends on the particle size range, form of results, accuracy required, or application. The theory is not neglected and the equipment used with each method is amply illustrated. *Subject Headings;* **1. Particle size determination 2. Aerosol sampling and analysis 3. Handbooks.** —*M.R.*

8.5–28 551.501.1(02)

Great Britain. Meteorological Office, **Observer's handbook.** 2nd ed. 221 p. 30 figs., 43 plates, 15 tables. London, H.M.S.O. **1956.** At head of t.p. M.O. 554. 15/–. **DWB, DLC**—The first edition of this handbook (successor to the **Meteorological Observer's Handbook**) appeared in 1952 (*see* 4.1–33, Jan. 1953, *MAB*). It "sets out the details of observational procedure in accordance with international recommendations" for all types of synoptic and climatological stations. It begins with a summary of observing procedure, including avoidance of errors, observing in the dark and care of equipment. Then follow chapters on observation of clouds (with 39 photos), visibility, present and past weather, wind, state of the ground, atmospheric pressure, temperature and humidity, rainfall, sunshine, and special phenomena, with notes on sketching. Instruments are illustrated and their management described, but for details of construction the reader is referred to the **Handbook of meteorological instruments** (1956). Appendices cover: Requirements at meteorological stations; Method of preparation of barometer correction cards from tables; Recording observations at a climatological station in the United Kingdom (synoptic stations are dealt with in the **Handbook of weather messages**); Airfield weather fitness number; Telegraphic reports from health resort stations; and Tables for reduction of barometric observations, calculation of cloud height and velocity, time of local noon, and conversion tables. *Subject Heading:* **1. Observers manuals.**—*C.E.P.B.*

8.5–29 551.508.24:551.501.8:778.3(02)

Harrison, Henry T. (*Supt. of Weather Service, Flight Operations Dept., United Air Lines*), **The display of weather echoes on the 5.5 cm airborne radar.** *United Air Lines, Meteorology Circular*, No. 39, March 15, **1956.** 96 p. 71 figs., numerous foot-refs. **DWB**—A manual for use by meteorologists, pilots or flight personnel in identifying snow, precipitation, thunderstorm, hail, tornado and turbulence areas in the Denver, Colo., area on the 5.5 cm airborne radar scopes. The scores of excellent photographs of echoes, all correlated with geographic and meteorological data, were chosen from over 8000 radar scope photographs in the UAL files. Weather conditions aloft and on the ground are described in detail under each set of 3–6 photos showing progress of weather situation as it approached the plane or vice versa (whether on ground or in air). Effect of tilting antenna or of changing gain setting is also illustrated by several examples. *Subject Headings:* **1. Air-borne radar photographs 2. Radar photographs 3. Aeronautical meteorology 4. Manuals 5. Denver, Colo. area.**—*M.R.*

## GENERAL GEOPHYSICS AND METEOROLOGY

### ARCTIC RESEARCH

*See also:* **Informal papers in Arctic met.** (Russell, Ballabon), 8.5–2; **Dynamic North** (U. S. Off. of Naval Operations), 8.5–4; **Center of the Arctic,** 8.5–12; **Standard isobaric surfaces, Arctic** (Heastie), 8.5–227.

8.5–30 550.3

Beals, C. S.; Hodgson, J. H.; Innes, M. M. S. et al., **Problems of geophysics in the Canadian Arctic.** *Arctic*, Montreal, 7(3/4):176–187, **1954.** 2 figs., 24 refs. **DLC**—The main Canadian contributions to the non-atmospheric branches of geophysics in the Canadian Arctic are reviewed. The fields covered are geomagnetism, including the correlation between magnetic storms and auroras, gravity and seismology. A survey of Arctic problems in these fields that will attract investigations in the future is presented. *Subject Headings:* **1. Geophysics 2. Geomagnetism 3. Canadian Arctic. I. Madill, R. G.**—*I.L.D.*

8.5–31 551.582.2(98)

*†Petterssen, Sverre; Jacobs, W. C. and Haynes, B. C., **Meteorology of the Arctic.** (In: **Dynamic North.** Wash., D. C., Technical Assistant to Chief of Naval Operations for Polar Projects, **1956.** Vol. 1, Pt. 2. 207 p. (loose leaf) 52 figs., 32 tables, 56 refs.) **DWB.** Originally issued under title **Meteorology of the Arctic Region,** as Pt. 1a–1d, of Vol. 7, of

**Encyclopedia Arctica** [unpub. ms., photostat, July 1951]. **DWB**—This is a published version of the outline of Arctic meteorology abstracted from a preliminary manuscript copy (*see* 51-184, Sept. 1954, *MAB*). Subjects include composition and structure of arctic atmosphere, inversions and lapse rates, acoustic phenomena, optical phenomena, air masses and fronts, cyclones and anticyclones, pressure, surface wind, winds aloft, temperature, precipitation, snow, thunder, humidity, cloud and ceiling, fog and visibility, sunshine and illumination, and an appendix containing extensive tables of mean monthly data for entire Arctic. Text includes many analytical tables and illustrations, schematic diagrams, histograms and isorithm charts. *Subject Headings;* **1. Climate of the Arctic 2. Arctic meteorology 3. Arctic.**—*M.R.*

8.5–32 551.583.2:551.311.12(98)

Sharp, Robert P. (*Calif. Inst. of Technology, Div. of Geological Sciences, Pasadena*), **Glaciers in the Arctic.** *Arctic*, Montreal, 9(1/2):78–117, **1956.** 6 figs. (incl. photos), table, 147 refs. (Also issued as: **Dynamic North.** Wash., D. C., Technical Assistant to Chief of Naval Operations for Polar Projects, **1956,** Vol. 1, Pt. 7. 44 p. (loose-leaf) 6 figs. (2 fold.), 147 refs.) **DLC**—An excellent review of the relative areas of glaciers in various parts of the N. Hemisphere, and a detailed coverage, area by area, of the names, locations, elevations, peculiarities and meteorological or climatological influences most important for development or recession of each glacier or glacial area. Greenland is given special attention. The glaciers of the European Arctic and N.E. America are generally retreating since 1870–1900, though individual cases show a reverse trend. The Alaska glaciers are shown to be advancing over the past 6 centuries reaching culmination in the last 200 years and in some cases being the farthest advanced today of any time in history, though neighboring glaciers may be retreating. Temperature is shown to be more important than radiation or weather in most of the retreating glaciers of the Atlantic Arctic. *Subject Headings:* **1. Arctic glaciers 2. Glacier variations in Arctic 3. Arctic.**—*M.R.*

8.5–33 910:061.1(211)(481)

Sternberg, Hans-Günther, **Das Norwegische Polarinstitut und die norwegische Polarforschung nach dem Kriege.** [The Norwegian Polar Institute and Norwegian polar investigation since the war.] *Die Erde*, No. 3/4:290-296, **1956.** fig. **DLC**—The history of the Institute since 1911 is summarized. The present Director is H. U. Sverdrup. Organization and expeditions are described and work accomplished or in hand in Spitzbergen, Jan Mayen, Greenland and the Antarctic mentioned. *Subject Headings:* **1. Polar exploration 2. Norwegian Polar Institute.**—*C.E.P.B.*

## ANTARCTIC RESEARCH

*See also:* **Antarctic research during IGY** (Wexler), 8.5–43.

8.5–34 550.3:91.04:061.3(99)

Burkhanov, V. F., **Sovetskaia Antarkticheskaia ekspeditsiia.** [Soviet Antarctic expedition.] *Priroda*, Moscow, 45(1):9–12, Jan. **1956.** 2 figs. **DLC**—The program of the Soviet expedition to the Antarctic in conjunction with IGY activities 1956–1958, is outlined. Ships and leading personnel participating, location of Antarctic observation stations, period of observations etc., are discussed. A map showing the location of the principal Antarctic stations of IGY participating countries and a photograph of the Soviet ship "Lena" are presented. *Subject Headings:* **1. International Geophysical Year, 1957–1958 2. U.S.S.R. participation in IGY 3. Soviet Antarctic Expedition.**—*I.L.D.*

8.5–35 551.506.1(99) 551.506.7:551.557(99)

Dingle, W. J. R., **Extract from [his] report on year's operation at Mawson.** *Australian Meteorological Magazine*, Melbourne, No. 10:57-70, Sept. **1955.** 4 photos, 3 tables. **DWB**—Data on monthly mean and maximum temperatures, monthly snowfall and cloudiness, monthly precipitation, including drifts and monthly maximum and minimum barometer pressure and a monthly summary of "pibal" flights for March 1954–Feb. 1955 are presented in tables. Photographs of the station, and an account of the observation procedure and techniques, the

nstruments and their performance are given. *Subject Headings:* **1. Annual summaries 2. Upper air wind data 3. Mawson, Antarctica.**—*I.L.D.*

8.5–36 551.311.181(269)

Frantz, Harry W., **Deshielos antarticos podrian causar catastrofes geológicas.** [Melting of the antarctic could cause geological catastrophies.] *Revista Geográfica de Chile*, Santiago de Chile, No. 13:111–112, May **1955. DWB**—Dr. L. GOULD is quoted as saying in a speech at the University Club at Stanford University that if the ice in Greenland and the Antarctic melted, sea level would be raised 22–27 m. all over the world. Plans for Antarctic investigations at at least 24 stations are underway. The U. S. is sending the ice breaker "Atka" to survey and make preparations during 1955/6 for the IGY. Notes on the enormous ice shelf blocking access to the Antarctic continent give some idea of the size and mass of the ice. *Subject Headings:* **1. Antarctic sea ice 2. International Geophysical Year, 1957–1958 3. Antarctica. I. Gould, Lawrence.**—*M.R.*

8.5–37 550.3:061.3(99)

Hoge, Edmond, **Projet d'une expédition scientifique sur le continent antarctique.** [Project for a scientific expedition to the Antarctic continent.] *Belgium. Institut Royal Météorologique, Contributions*, No. 23, **1955.** 6 p. fig. **DWB, DLC.** Reprint from: *Académie Royale des Sciences, des Lettres et des Beaux-arts de Belgique, Brussels, Bulletin de la Claase des Sciences*, May 7, **1955.** p. 560–565.—A summary of the Belgian plans for IGY, 1957/58; the Institut Royal Météorologique d'Uccle, the Centre de Physique du Globe de Dourbes, the Observatoire Royal d'Uccle, and the Station Magnétique de Manhay in Belgium, and the stations at Élisabethville, Bunia, Leopoldville, Lwiro and Coquilatville in the Belgian Congo, will participate. A station at 95°E, 67°S on Knox coast, Queen Mary Land will be occupied by the Belgians for meteorological, auroral, geomagnetic and ionospheric investigations. *Subject Headings:* **1. International Geophysical Year program 2. International Geophysical Year, 1957–1958 3. Belgian participation in IGY 4. Belgian Congo 5. Knox Coast, Antarctica.**—*M.R.*

8.5–38 551.513:551.515(99)

Loewe, F. and Lamb, H. H., **Meteorology and Antarctic discoveries.** *Geographical Journal*, 122(4):535–537, Dec. **1956. DWB**—LOEWE discusses suggestion by H. H. LAMB and G. P. BRITTON, (*see* 7.2–132, Feb. 1956, *MAB*) that the extreme winds of Adélie Land are due to concentration in a trough, but considers the explanation doubtful. He mentions earlier examples of the use of meteorological evidence to predict geographical features. LAMB produces other evidence (Mediterranean, Greenland) supporting his view, and refers to BYRD's confirmation of his own and MEINARDUS' earlier prediction that the ice cap rises to 14,000 ft. *Subject Headings:* **1. Atmospheric circulation 2. Antarctica.**—*C.E.P.B.*

## IGY

*See also:* **Soviet expedition to Antarctic during IGY** (Burkhanov), 8.5–34.

8.5–39 550.3:061.3

**International Geophysical Year.** *Physics Today*, 9(4):10–11, April **1956. DWB, DGL**—Article describes IGY, U. S. participation, Antarctic operations (Operation Deepfreeze with U.S.S. "Atka" on reconnaissance 1954/5, and at Little America in 1955/6), cosmic ray, rocket, satellite, and related aspects of program, and the chief personnel involved. *Subject Headings:* **1. International Geophysical Year, 1957–1958 2. U. S. International Geophysical Year program 3. Antarctic International Geophysical Year operations.**—*M.R.*

8.5–40 550.3:061.3

Kaplan, Joseph, **The International Geophysical Year program of the United States.** *American Geophysical Union, Geophysical Monograph*, No. 1:1–6, **1956. DLC**—A brief description of the origin and development of the International Geophysical Year program is given. Some of the international aspects of scientific cooperation under the program are discussed with illustrative examples of how such cooperation enhances the value of certain

selected experiments. United States contribution to the planning and execution of some joint undertakings is described in more detail and special reference is made to World Archives and Data Centers which will serve to accumulate source material and make it accessible to scientists of all participating nations. *Subject Headings:* **1. International Geophysical Year program 2. U. S. participation in IGY.**—*Author's abstract.*

8.5–41 550.3:061.3:551.507.362

Kaplan, Joseph (*Univ. of Calif. at L.A.*), **The scientific program of the International Geophysical Year.** *National Academy of Sciences, Proceedings,* 40(10):026–931, Oct. 1954 **DWB**—Selection of time, places for observations and scope of the general IGY program and details of the program of 6 of the 11 fields to be investigated (glaciology, oceanography, geomagnetism, latitude and longitude, cosmic rays and rocket exploration of upper atmosphere) are outlined by the chairman of the U. S. National Committee for the IGY. At the time of writing it was expected that 37 rockoons and 36 aerobees would be launched from sites in Alaska, Canada, Greenland and New Mexico. *Subject Headings:* **1. International Geophysical Year program 2. Rocket exploration of the upper atmosphere.**—*M.R.*

8.5–42 550.3:061.3:551.507.362

Kaplan, Joseph, **Rocket and satellite studies during the IGY.** *Aeronautical Engineering Review,* N. Y., 15(4):64–67, April 1954. **DLC**—A general survey and history of the proposed rocket and satellite program for IGY, written after the President (of the U. S.) had announced the U. S. satellite plans and the details had been released through CSAGI at Brussels on July 29, 1955. The membership of the Technical Panel on the Earth Satellite Program is listed. Logistic support for the Antarctic, the Rocket and Satellite program will come from the Dept. of Defense. *Subject Headings:* **1. International Geophysical Year program 2. Satellite program.**—*M.R.*

8.5–43 551.5:550.3(99)

Wexler, H., **Antarctic research during the International Geophysical Year.** *American Geophysical Union, Geophysical Monograph,* No. 1:7–12, 1956. 2 figs., 2 tables, 5 refs. **DLC**—During 1957 and 1958 a dozen nations will maintain 40 geophysical stations in Antarctica. Thus, this continent, the fifth largest in the world, will be subjected to concentrated, coordinated geophysical exploration to a degree not dreamed possible a few years ago. For the first time, geophysical stations will be established for an extended period of time well away from the coasts, deep in the interior of the continent. Scientists from the participating nations will cooperate in examining the composition, structure, winds, temperatures, and electrical properties of an atmosphere cut off from sunlight for many months. The thickness of the ice will be surveyed for indications of changes in volume to determine if Antarctic climate is changing. The break-up and movement of the peripheral ice will be studied as a function of wind and ocean currents. The aurora australis will be studied and compared with its Northern Hemisphere counterpart. Intensive measurements will be made of geomagnetism, cosmic rays, airglow, and the ionosphere in an attempt to throw light on the physics of the high atmosphere. *Subject Headings:* **1. International Geophysical Year program 2. Antarctic meteorological research.**—*Author's abstract.*

## WMO

*See also:* **Efforts to develop arid lands** (Langlo), 8.5–308.

8.5–44 551.5:061.3

**Second World Meteorological Congress.** *World Meteorological Organization, WMO Bulletin,* 4(3):94–105, July 1955. photo. **DWB**—The congress was held at Geneva from April 14 to May 13, 1955 under the presidency of Dr. F. W. Reichelderfer, Chief of the U. S. Weather Bureau. Delegates from 83 member and 5 non-member countries were present. The session was held at the Palais des Nations (photo shows Assembly Hall during meeting). Technical commissions, technical assistance, technical publications, IGY, water resources development, arid zone and humid tropics, telecommunications, films, secretariat, budget

and new officers are discussed along with other subjects. The opening and closing meetings are described in detail. *Subject Headings:* **1. WMO. Congresses 2. Geneva, Switzerland.** —*M.R.*

8.5–45 551.5:061.3

**Sixth Session of the Executive Committee,** [and] **Seventh Session of the Executive Committee.** *World Meteorological Organization, WMO Bulletin*, 4(3):105–108, July **1955. DWB**—The sixth session was held at Geneva just prior to the second congress, April 12 and 13, 1955. Only 6 meetings were held. Legal and technical questions and reports of working groups are discussed. The budget for technical assistance came to $500,000 for 1956. The seventh session was held just after the Congress, at Geneva (May 13–17, 1955). André Viaut, the new President of WMO, was Chairman. The budget for 1956–59 was set at $400,000. The new Secretary General, D. A. Davis, was to take office Aug. 1, 1955 and Dr. Swoboda's contract would end on Aug. 14, 1955. Working groups on IGY, etc. were formed. The annual IMO prize for outstanding work in meteorology was awarded to Th. Hesselberg. *Subject Heading:* **1. WMO Executive Committee.**—*M.R.*

8.5–46 551.5:061.3

Zigun, V. P., **Pervaia sessia Aziatskoĭ regional'noĭ assotsiatsii Vsemirnoĭ Meteorologicheskoĭ Organizatsii.** [First meeting of the Asian Regional Association of the WMO.] *Meteorologiia i Gidrologiia*, Moscow, No. 3:62–63, May/June **1955. DWB**—A brief account of the conference which was held in Feb. 1955 in New Delhi, India. The Soviet participants were A. A. Zolotukhin, V. P. Zigun, and N. V. Petrenko. The resolutions covered the standardization of barometers of all the Asiatic countries, extension of meteorological networks, organizations of agricultural, meteorological and hydrological observations in Asia and the exchange of meteorological information. The names of the Soviet scientists elected to various committees are given. *Subject Heading:* **1. WMO. Regional Association II (Asia).** —*I.L.D.*

8.5–47 551.5:061.3

Aujeszky, László, **A Meteorológiai Világszervezet Európa-értekezlete Dubrovnikban (1956. március 12–14).** [European meeting of the WMO in Dubrovnik, March 12–14, 1956.] *Időjárás*, Budapest, 60(2):112–114, March/April **1956. DLC.** Also: Petrovič, Š. and Vesecký, A., **Konferencia Europskej regionálnej asociacie SMO v Dubrovníku v dnoch 12. až 24. marca 1956.** *Meteorologické Zprávy*, 9(3):65–66, **1956.** photo. Also: Obuljen, A., **Drugo zasedanje Regionalne asocijacije za Evropu SMO.** *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 5(1/2):17–19, Jan./June **1956. DWB**—The second meeting of the WMO Regional Association VI (Europe) was held at Dubrovnik, Yugoslavia, on March 12–14, 1956 with the participation of 30 European countries. The subjects discussed at this meeting are outlined. Resolutions adopted concern radioactivity measurements, size of the networks required from each country, use of radiation correction on radiosondes, reporting of the state of the soil, unification of the two teleprint circuits now operating in Europe, and new regulation of climagrams. Budapest was selected as the site of the next (third) meeting of Regional Association VI, to be held in 1958. *Subject Headings:* **1. WMO Meetings 2. WMO. Regional Association VI (Europe).**—*G.T.*

8.5–48 551.582.3

Ashford, O. M., **World climatic atlas.** *World Meteorological Organization, WMO Bulletin*, 5(1):18–19, Jan. **1956.** photo. **DWB**—The Working Group on Climatic Atlases of the WMO Commission on Climatology met at Centerton, N. J., on Dec. 5–18, 1955, under the chairmanship of C. W. Thornthwaite and attended by N. Rosenan, S. P. Jackson (Ed. of **African Climatic Atlas**), O. M. Ashford and Kenneth Hare. Recommendations included the preparation of a series of loose leaf national maps of many climatic elements to be combined regionally, under the guidance of the regional associations. Isohyetal charts have first priority. Projections, scales, isolines, tints and other details were considered. *Subject Headings:* **1. World climatic atlases 2. Climatic charts. I. Thornthwaite, C. W.**—*M.R.*

## SERVICES

*See also:* **Aeronautical statutes, etc., 8.5–207.**

8.5–49 551.581:061.1(439.1)

Bacsó, Nándor, **Az éghajlatkutatás operatív kérdései.** [Operational problems in climatology.] *Időjárás*, Budapest, 58(5):298–301, Sept./Oct. **1954.** ref. **DWB**—The principal problems of future work in the Hungarian climatological service are discussed in connection with the following phases: 1) operation, modernization and development of the climatological network, 2) evaluation and analysis of climatological data, with particular attention to international requirements, 3) reports and publications, 4) special data analysis for research work and 5) service to government, industry, agriculture and various institutions. *Subject Headings:* **1. Climatological services 2. Hungarian climatological service.**—*G.T.*

8.5–50 551.58:061.1(71)

Boughner, C. C. (*Supt. of Climat., Toronto, Canada*), **Climatological services.** *Weatherwise*, Boston, 9(2):58–60, April **1956. DWB**—The many activities of the extensive climatological service and network in Canada are briefly described. A staff of 45, 6 of whom are professional meteorologists, now handles the central climatological service at Toronto. Branch offices at Victoria, Edmonton, Regina, Saint John, Torbay and Montreal serve local needs. At present 1517 stations, 247 of them synoptic reporting stations, and 857 cooperative temperature and precipitation and 413 precipitation stations comprise the network. In addition there are 32 radiosonde, 26 of them rawinsonde, and 44 pibal stations. "Climat" broadcasts, 4 facsimile charts, a monthly weather map and monthly record of observations in Canada, hourly weather summaries for 150 airports, weekly crop weather summaries for 175 stations in the prairies, and many special publications are provided. A punched card program was begun in 1950, and now 38 operations are involved. *Subject Headings:* **1. Canadian climatological services 2. Punched card programs 3. Canada.**—*M.R.*

8.5–51 551.5:061.1(59)

**The Meteorological Service of Viet-Nam.** *World Meteorological Organization, WMO Bulletin*, 4(3):116–118, July **1955.** 2 figs. **DWB**—The Indochina service was started in 1897 under direction of MASCART to study tropical storms for the issuance of warnings, and to study the climate for agricultural purposes. In 1954 the service was divided between 3 states—Cambodia, Laos and Viet-Nam. The Viet-Nam service has its headquarters at Saigon, the main aviation forecast headquarters at Saigon, and another at Tourane. There are 10 observing stations, 5 with pilot balloon observing equipment and 50 climatic or rainfall stations. The Saigon center prepares 1000 to 1500 flight forecasts a month. A radiosonde station is being established at Tourane and an automatic weather station on the desert island of Ituaba. *Subject Headings:* **1. Meteorological services 2. Viet-Nam weather service 3. Indochina 4. Viet-Nam.**—*M.R.*

8.5–52 551.579:06

†Kohler, Max Adam, **Hydrologic services in Yugoslavia.** Prepared for the Government of Yugoslavia, by United Nations Technical Assistance Administration and World Meteorological Organization. *United Nations, Technical Assistance Programme*, TAA/NS/YUG/12, Nov. 19, **1954.** 17 p. table, 44 refs. **DWB**—MAX KOHLER spent about 6 weeks in Yugoslavia as a technical assistance expert to advise the government on improvement of the hydrologic service. He arrived on Feb. 11, and left on March 25, 1953. Organization, staff and facilities in the Federal and 6 regional (Republic) services; networks, observational equipment, data analysis and publications, libraries, and budget are reviewed and recommendations made for improving observational network, flood forecasting service, training of personnel, libraries in the national services, etc. *Subject Headings:* **1. Hydrologic services 2. Technical assistance missions 3. Yugoslavia.**—*M.R.*

8.5–53 551.5:63:061.4(47)

Rudnev, G. V., **Gidrometeorologicheskaia Sluzhba na Vsesoiuznoĭ Sel'skokhoziaĭstvennoĭ Vystavke 1955 goda.** [The Hydrometeorological Service at the All-Union Agricultural

Exposition of 1955.] *Meteorologiia i Gidrologiia*, Moscow, No. 3:23–24, May/June 1955. **DWB**—A description of the exhibits of the Hydrometeorological Service at the All-Union Agricultural Exposition of 1955. They include maps showing the moisture supply for spring wheat in virgin lands, the agricultural meteorological evaluation of grazing possibilities in the Kazakh SSR, the agricultural climatic regions of the USSR, etc., data on frost, drought and "sukhovei" prevention, exhibits on long and short range weather forecasting, etc. *Subject Headings:* **1. Agricultural meteorology exhibitions 2. U.S.S.R.**—*I.L.D.*

## OBSERVATORIES

*See also:* **Golden jubilee, Alibag Obs.**, 8.5–62.

8.5–54 551.501.9:551.43(969)

Fox, Roy L., **New Mauna Loa Observatory unit.** *Nature*, London, 178(4545):1272, Dec. 8, **1956.** Also his: **Mauna Loa Observatory.** *Weatherwise*, Boston, 9(5):147–150, Oct. **1956.** 3 figs. (incl. photos), table. Also: **Mauna Loa Observatory.** *Washington Academy of Sciences, Journal*, 46(10):310, Oct. **1956.** Also articles of same title, in *American Meteorological Society, Bulletin*, 37(9):487–488, Nov. **1956** and in *Science*, Wash., D. C., 124(3221):531, Sept. 21, **1956. DLC, DWB**—The new Hawaiian meteorological observatory, at 11,134 ft a.s.l. on the north slope, to be operated by the U. S. Weather Bureau, is briefly described. *Subject Headings:* **1. Mountain observatories 2. Mauna Loa, Hawaii.**—*C.E.P.B.*

8.5–55 522.1 551.577.37(415)

Lindsay, E. M. (*Dir. Armagh Obs.*), **Armagh Observatory in 1954.** *Irish Astronomical Journal*, Armagh, 3(5):131–132, March **1955. DLC.** Reprinted as *Armagh, Ireland. Observatory, Leaflet*, No. 28. **DWB**—New activities of the Armagh Observatory as reported were mainly astronomical, but mention was made of reduction of meteorological observations by Sheelagh Grew. The year 1954 was one of the 8 wettest years since 1840 (122% of average since 1928). Decadal mean temperatures from 1850 to date are being compiled for the Meteorological Office. Publications include meteorological readings at Armagh Observatory on the day of the eclipse, June 30, 1954, by Sheelagh Grew. Papers on meteors are in process. *Subject Headings:* **1. Astronomical observatories 2. Long period records 3. Excessive rainfall 4. Armagh Observatory, Ireland.**—*M.R.*

8.5–56 551.5:551.43(497.1)

Manohin, V., **Neka zapažanja u vezi sa razvojem vremena na Kredarici, 2515 m.** [Some observations on weather development on Kredarica at 2,515 m.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 3(3/4):103–105, July/Dec. **1954. DWB**—Local characteristics of weather development on Kredarica mountain include warm mornings and early daily temperature maxima during fair-weather conditions. During disturbances temperature on the mountain is lower than at equal height in free atmosphere. Northerly winds occur on Kredarica when the general wind direction is from SW. *Subject Headings:* **1. Mountain meteorology 2. Kredarica, Yugoslavia.**—*G.T.*

8.5–57 551.501.9(494)

Mörikofer, W., **Vom Physikalisch-Meteorologischen Observatorium, Davos.** [The Physical-Meteorological Observatory at Davos.] Reprint from *Davoser Revue*, 28(11/12):235–238, **1953.** photos. **DWB**—A description of the building housing the observatory, the recent (1951) rebuilding of the roof upon which the various instruments are located and of the scientific activities being carried on is given and the importance of Davos in climatic therapy is discussed. Photographs of the observatory and of the roof are reproduced. *Subject Headings:* **1. Davos, Switzerland. Physikalisch-Meteorologisches Observatorium 2. Meteorological instruments.**—*I.L.D.*

8.5–58 537.3:550.38(547)

*Sohoni, V. V., Pramanik, S. K., and Malurkar, S. L. (*India Met. Dept.*), **Effect of electric current on the magnetic instruments at Alibag Observatory.** *Indian Journal of Meteorology*

*and Geophysics*, 4(1):45–61, Jan. 1953. 2 figs., 4 tables. **DWB, DLC**—The Colaba Observatory was established in 1823 and magnetic observations were begun in 1841. Magnetic observations began at Alibag, 18 miles south of Bombay in 1904 and comparative readings were made at the 2 observatories for 2 years. Thus >100 years of continuous record is available. Electric currents were introduced into the vicinity of Alibag in 1923. This being the only one of the former 5 magnetic stations in this part of the world with a long series of records, the transmission of electrical energy within 18 miles of the observatory was forbidden by law. Constant pressure for relaxation of these restrictions resulted in an extensive series of tests as to the effect of generators and DC and AC currents on records at the observatory. Finally, a new set of regulations was drawn up and made effective. Complete data for 1950–51 tests are given. *Subject Headings:* **1. Magnetic data 2. Magnetic observatories 3. Electric currents 4. Alibag Observatory, India.**—*M.R.*

8.5–59 523.7

ten Bruggencate, Paul and Jäger, F. W., **Das Turmteleskop der Göttinger Sternwarte.** [The tower telescope of the Göttingen observatory.] *Akademie der Wissenschaften in Göttingen, Math.-Phys. Klasse, IIa Math.-Phys.-Chem. Abteilung, Nachrichten*, No. 5, **1951.** 26 p. 22 figs., 11 refs. **DLC**—A detailed description with plans and photos of the new observatory, completed in 1943/44, for the study of solar physics, including especially spectrohelioscopy. *Subject Headings:* **1. Astrophysical observatories 2. Göttingen astrophysical Observatory 3. Göttingen, Germany.**—*C.E.P.B.*

## CONFERENCES AND SYMPOSIA

*See also:* **Weather Radar Conference Proceedings** (A.M.S. and U. S. Signal Corps), 8.5–5; **Second World Met. Congress,** 8.5–44; **Agromet. Conf., Frankfurt a.M.,** 8.5–110.

8.5–60 551.594.7:621.396.8:061.3

International Council of Scientific Unions. Joint Commission on Radio-Meteorology. Brussels, Aug. 16–18, 1954. **Proceedings of the 3rd meeting.** pub. **1955.** 30 p. t-p. in French and English. Text in French or English. **DWB**—Proceedings of the conference, including a discussion of P. A. SHEPPARD's talk on mean structure and time variations in the troposphere, and VENKITISHWARAN's on turbulence determinations by radiosonde, are followed by a review of work on tropospheric refraction measurements and theory (p. 7–13); on refractive index profiles, ray theory and wave treatments (p. 13–16), precipitation studies by radar (p. 16–18), and atmospherics (p. 18–26). Resolutions regarding IGY and studies to be made by URSI Commissions are found on p. 28–30. *Subject Headings:* **1. Radio meteorology conferences 2. Tropospheric propagation 3. Sferics. I. Van Mieghem, J. II. Marshall, J. S. III. Lugeon, J.**—*M.R.*

8.5–61 551.5:061.6

**Meteorological Research Committee.** *Meteorological Magazine*, London, 85(1013):338–341, Nov. **1956. DWB**—Accounts of meeting of Physical Sub-Committee on July 10, 1956, and Synoptic and Dynamical Sub-Committee on July 19. Abstracts of 7 papers discussed are appended. *Subject Heading:* **1. Great Britain. Meteorological Research Committee.**—*C.E.P.B.*

8.5–62 551.521.64:550.38:551.590.21(08)

**Symposium on geomagnetic activity and solar and terrestrial relationships held at Colaba Observatory, Bombay, Dec. 13, 1954.** *Indian Journal of Meteorology and Geophysics*, Delhi, 6(1):1–4, Jan. **1954. DWB, DLC.** Also: **Golden jubilee celebrations of the Alibag Magnetic Observatory.** *Ibid.*, 6(1):65, Jan. **1955. DWB, DLC**—In connection with the golden jubilee of the Alibag Magnetic Observatory a symposium on "Geomagnetic Activity and Solar and Terrestrial Relationships" was held in Dec. 1954. Summaries of addresses delivered by various invited guests are presented. The participants discussed intensity variations of cosmic rays at sea-level and at mountain heights, correlation of cosmic ray intensities with meteorological factors and solar activity, etc. The discussions of the papers delivered are summarized.

*Subject Headings:* **1. Cosmic ray variations 2. Geomagnetic activity 3. Solar influences 4. Symposia.**—*I.L.D.*

8.5–63 551.579:628.1:551.585.5

White, Gilbert F., **Symposium on the Future of the Arid Lands.** *Geographical Review*, N. Y., 45(3):434–435, July **1955. DWB, DLC**—The author summarizes briefly some of the papers presented at the symposium which was held in Albuquerque, New Mexico (USA) under the auspices of the American Association for the Advancement of Science on April 26–29, 1955. The subjects discussed included the variability and predictability of water supply in arid regions, obstacles to the utilization of present land and water resources, artificial precipitation, etc. *Subject Headings:* **1. Water supply survey 2. Arid zone climatology.**—*I.L.D.*

8.5–64 551.557:551.510.535:08

**Symposium on ionospheric drifts.** *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 14(10):482–485, Oct. **1955.** 2 refs. **DWB, DLC**—Report of symposium held at the National Physical Laboratory of India at New Delhi on July 30, 1955, in which ionospheric drifts and their measurement were discussed by Dr. K. S. Krishnan, S. N. Mitra, K. R. Ramanathan, Nanda Bhargava and others. Fading drifts in ionospheric records, the 150 km echo at nighttime, vertical ion transport and other aspects of this special problem were considered. *Subject Headings:* **1. Ionospheric drift 2. Symposia 3. New Delhi, India.**—*M.R.*

## SOCIETIES AND INSTITUTIONS

*See also:* **Norwegian Polar Inst.** (Sternberg), 8.5–33.

8.5–65 061.2(042) 551.5:92

Hinshelwood, Sir Cyril, **The Royal Society Presidential Address.** *Nature*, London, 178(4545):1261–1266, Dec. 8, **1956. DWB**—The awards in 1956 included Copley Medal to P. M. S. Blackett for work including cosmic ray investigation and radio astronomy, and Hughes Medal to Viscount Cherwell for work on aircraft, meteors, etc. The remainder of the address (of no meteorological interest) dealt with **Some interactions of the physical and the biological sciences.** *Subject Headings:* **1. Societies 2. Addresses. I. Royal Society of London II. Blackett, P. M. S. III. Cherwell, Lord.**—*C.E.P.B.*

8.5–66 551.5:061.2

**Institucion y primera convocatoria, por la Royal Meteorological Society de Londres, de un premio en memoria der Sir Napier Shaw.** [Establishment of the Sir Napier Shaw Prize by the Royal Meteorological Society, and the conditions of the first award.] *Urania*, Barcelona, 39(238):197–198, July/Sept. **1954.** Also: **Napier Shaw Memorial Prize: first award.** *Weather*, London, 11(7):235, July **1956.** port. Also: **The Napier Shaw Memorial Prize: award of the first Napier Shaw Memorial Prize.** *Royal Meteorological Society, Quarterly Journal*, 82(353):375, July **1956.** Also: **Napier Shaw Memorial Prize.** *American Meteorological Society, Bulletin*, 37(8):425, Oct. **1956. DWB**—The Royal Meteorological Society on March 4, 1954 established a periodic prize of £100 sterling in honor of Napier Shaw for an original contribution on the subject of the Energetics of the General Circulation, in English, but open to anyone in the world. Papers were to be received by the Society not later than March 4, 1956. In the second, third and fourth notes mention is made of the awarding of the first prize to Dr. Norman A. Phillips of the Institute for Advanced Study, Princeton for his paper **General Circulation of the Atmosphere: a numerical experiment.** The paper was published in the *Royal Meteorological Society, Quarterly Journal*, 82(352):123–164, April 1956 (*See item* 7.9–142, Sept. 1956, *MAB.*) *Subject Headings:* **1. Napier Shaw Prize 2. General circulation energetics. I. Phillips, Norman A.**—*M.R.*

8.5–67 551.46:061

Ihl Cléricus, Pablo, **El Instituto Oceanográfico de Chile: necesidad de organizarlo.** [The Institute of Oceanography of Chile: the necessity of organizing it.] *Revista Geográfica de*

*Chile "Terra Australia,"* Santiago de Chile, No. 13:69–79, May **1955.** fig. **DWB**—An elaborate, though preliminary plan is promulgated for organizing oceanographic work in Chile along lines similar to that in the chief maritime countries, and a national Institute of Oceanography for Chile, with biological, physical and chemical laboratories, and 7 oceanographic stations in different sections of the littoral, and having slightly varying functions. Economic importance of such an institute (e.g., for fisheries), types of studies to be undertaken, various functions of the Institute (educational, economic, cultural, international and food producing), etc. are outlined. *Subject Headings:* **1. Oceanographic institutes 2. Oceanographic research 3. Chile.**—*M.R.*

8.5–68 551.5:02 550.3:02

U. S. Air Force. Cambridge Research Center. Research Services Division, **Semiannual Progress Report, July 1–Dec. 31, 1953, and Jan. 1–June 30, 1954.** about 35 p. each. tables, diagrs. **DWB**—Accounts of the functions and services of various branches of the AFCRC Research Services Division, and especially of the Scientific Literature Branch which consists of a Publications Section, a library (actually 3 separate libraries) and a Technical Information Division as well as an Historical Unit. The library contains about 100,000 pieces, including 16,000 monographs, 32,000 scarce reprints and 35,000 serial volumes, making it one of the best geophysical and meteorological collections in the world. *Subject Headings:* **1. Meteorological libraries 2. Geophysical libraries 3. U. S. Air Force. Cambridge Research Center. I. Davis, Charles H.**—*M.R.*

## EDUCATION, HISTORY AND BIOGRAPHY

### EDUCATION

8.5–69 551.5:378

Gloyne, R. W., **The teaching of meteorology.** *Weather*, 12(1):32, Jan. **1957. DWB**—Considers that meteorology should be taught as a branch of geophysics, with analogies in biological and social sciences. Thinking structurally and synthetically is important. *Subject Heading:* **1. Teaching of meteorology.**—*C.E.P.B.*

8.5–70 551.579:378

Ivanov, N. I., **25 let Moskovskomu gidrometeorologicheskomu tekhnikumu.** [Twenty-five years of Moscow Hydrometeorological Technical School.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:63–64, Nov./Dec. **1955. DWB, DLC**—The educational achievements of the Moscow Hydrometeorological Technical School which is the oldest teaching institution in the hydrometeorological service of the U.S.S.R. for training meteorological technicians are summarized. During the 25 years of its existence the school prepared 4000 middle grade specialists; 500 of them during the past two years. Education includes not only the physical sciences but also political indoctrination. *Subject Headings:* **1. Moscow Hydrometeorological Technical School 2. Training in meteorology.**—*I.L.D.*

8.5–71 551.5:378 551.4:378

Lima, Peru. Universidad Nacional Mayor de San Marcos. Instituto de Geografía, **Curriculum.** Its *Revista*, No. 1:3–64, **1954.** Also: Schweigger, Erwin, **Oceanografía aplicada al Peru.** [Oceanography applied to Peru.] *Ibid.*, No. 1:54–59, **1954. DWB**—Courses offered in the four-year program of geographical instruction (1953) at Lima University are listed and discussed. Biographic data and detailed professional curricula of each professor are given. The instruction program includes courses in climatology in the second and third years (given by Rafael Dávila Cuevas) and hydrology (Juan N. Portocarrero y C.) and oceanography (Erwin Schweigger) in the fourth year. The climatological (meteorological) courses comprise theoretical (dynamics of the atmosphere, general circulation, cyclone theory, cloud and precipitation studies, statistical climatology, physical climatology, climatic effects of oceans and continents, of orography, lakes, vegetation and human activities; climate

assification, climate of Peru, microclimate, etc.) and practical studies (measurement of eteorological elements, visual observation, data and chart analysis). *Subject Headings:* **Teaching of meteorology 2. Teaching of geography. I. Dávila Cuevas, Rafael II. Portorrero y C., Juan N.**—*G.T.*

## BIOGRAPHY

8.5–72 551.5(92)

Koschmieder, H., **Richard Assmann, 13.4.1845–28.5.1918.** [Biographical sketch.] *Beiäge zur Physik der Atmosphäre*, Frankfurt, a.M., 29(1):3–8, **1956.** 3 photos. **DWB**—A ng and interesting account of the life and scientific work of Richard Assmann, the founder **Beiträge zur Physik der Freien Atmosphäre** and **Das Wetter,** the inventor of the Assmann spiration psychrometer and the rubber sounding balloon; the co-discoverer of the stratosphere, under of the Aeronautical Observatory at Lindenberg and author of many important publicaons. He was one of the leading, if not the leading international aerologist of the past century. e died in Giessen, 4 years after retirement. A monument in his honor, placed on the Lindenerg Observatory grounds in Aug. 1940, was donated by F. Schmidt-Ott. *Subject Headings:* **Biography 2. Assmann, Richard.**—*M.R.*

8.5–73 551.5:92

Georgi, Johannes, **Wilhelm Meinardus, Nestor der deutschen Polarforschung zum 85. eburtstag.** [Wilhelm Meinardus, Nestor of German polar research, on his 85th birthday.] *olarforschung*, Kiel, Ser. 3, 22(1/2):181–185, 1952, pub. Aug. 15, **1954.** fig., table. **DWB**— laudatory survey of the scientific activity of Prof. Meinardus with a brief review of his ost important published works. Meinardus is called the founder of modern Antarctic imatology and synoptic meteorology although he never was permitted by fate to participate any expeditions to the Antarctic and all his historical accomplishments in this field were hieved by his toilsome and self-denying processing and analysis of rich observational material id data assembled by other explorers. Prof. Meinardus died unexpectedly on July 14, 954 before the publication of this paper. *Subject Headings:* **1. Biography 2. Meinardus, Vilhelm.**—*A.M.P.*

8.5–74 551.5:92

Grotewahl, Max, **Prof. Dr. Max Robitzsch.** [Obituary note.] *Polarforschung*, Kiel, er. 3, 22(1/2):145, 1952, pub. Aug. 15, **1954. DWB**—A brief obituary of the late (1877–952) professor and director of the Geophysical Institute whose main field of activity was erology, investigations of physical processes in the upper atmosphere, measurement and cording techniques and instruments. He was also an explorer of the Arctic and was the rst to recognize the importance of aerological observation for meteorology in the Arctic and founder and contributor of this journal. *Subject Headings:* **1. Obituaries 2. Robitzsch, Max.**—*A.M.P.*

8.5–75 551.5:92

Gordon, A. H., **Obituary [of] Gustav J. H. Swoboda, Ph.D.** *Meteorological Magazine*, ondon, 85(1013):349–350, Nov. **1956. DWB**—The Secretary-General of the WMO died ept. 4, 1956, after an operation. Born Prague 1893, chief of forecasting services of State Meteorological Institute at Prague 1920–1938, then Chief of Secretariat of I.M.O. (later .M.O.) retiring Aug. 1955. (*See* 8.2–33 for obituary by O. G. Sutton.) *Subject Headings:* **Obituaries 2. Swoboda, G. J. H.**—*C.E.P.B.*

8.5–76 551.46:92

Dobrovol'skiĭ, A. D., **Nikolaĭ Nikolaevich Zubov: K 70-letiiu so dnia rozhdeniia.** [In onor of the 70th birthday of N. N. Zubov.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, o. 5:95–96, Sept./Oct. **1955. DLC.** Also his article of similar title in *Meteorologiia i Gidrogiia*, Leningrad, No. 5:67–68, Sept./Oct. **1955.** port. **DWB, DLC**—This biographical ketch of N. N. Zubov, the distinguished Soviet oceanographer, who was born May 24, 1885, ontains an account of his education, of his scientific work, of the expeditions in which he

participated and of his activities as a teacher. *Subject Headings;* **1. Biography 2. N. N. Zubov**—*I.L.D.*

## BIBLIOGRAPHY

*See also:* **Greenland** (Ignat'ev), 8.5–13; **Thermal balance of earth's surface** (Budyko), 8.5–20; **Ocean wave bibliography** (Bruns), 8.5–26.

8.5–77 551.5:63:01

†Barger, Gerald L. (*comp.*), **A selected bibliography on agricultural meteorology.** Wash D. C., U. S. Weather Bureau, July **1956.** 99 p. **DWB**—A rough compilation of about 150 references to literature on the following aspects of agricultural meteorology, arranged alphabetically by author under the 17 separate headings: 1) climate and plants (general) 2) light; 3) temperature (general); 4) soil temperature; 5) radiation and microclimate; 6) phenology; 7) growth units; 8) moisture (general); 9) condensation and absorption; 10) evapotranspiration; 11) soil moisture and irrigation; 12) drought; 13) plant diseases; 14) insects 15) animals; 16) miscellaneous; 17) growth regulators. This is not considered as a definitive bibliography. *Subject Headings:* **1. Agricultural meteorology bibliographies 2. Bibliography on agricultural meteorology.**—*M.R.*

8.5–78 551.5:061:01

†U. S. Weather Bureau, **Weather Bureau Publications. 1954.** (12 p.) Pt. 1, **Selected list of publications,** Oct. 1954. Pt. 2, **Selected list for weather science study.** Nov. 1954. **DWB**—Fourteen periodical publications (synoptic charts, climatic data, compilations, reviews etc.), 8 other serial publications, 18 circulars and manuals and a number of other publications of the U.S.W.B. are listed and described with prices quoted, in Pt. 1. In Pt. 2 there are listed 19 of the items considered suitable for classroom use for study of weather science. *Subject Headings:* **1. U. S. Weather Bureau publications 2. Publications price lists 3. Bibliography of U.S.W.B. publications.**—*M.R.*

8.5–79 014.3

McCasland, G. E. (*Univ. of Toronto, Canada*), **A concise form of scientific literature citations.** *Science,* Wash., D. C., 120(3108):150–152, July 23, **1954.** 3 tables. **DLC**—Coding journal citations (vol., year, page and serial title) can save a lot of space if the system illustrated here would be adopted. 500,000 journals can be cited with use of only 4 letters. Year can be reduced to two digits (53 for 1953). The page comes before the serial code, the year after. [Aside from obvious complications, the reader who did not have the code at hand would be helpless, and the constantly changing list would mean constant revision and uncertainty where a new serial was encountered.] *Subject Heading:* **1. Coding literature citations.**—*M.R.*

8.5–80 55(05):016

**Periodica Geophysica.** [Geophysical periodicals.] Ed. by Otto Meisser and Ulrich Gerhardt. Berlin, Akademie-Verlag, **1956.** 184 p. Subtitle: **Nachweis von Zeitschriften in Bibliotheken der Deutschen Demokratischen Republik.** *Bücherei des Dokumentalisten,* No. 4, issued by Zentralstelle für Wissenschaftliche Literatur, Berlin.—An excellent list of >1500 meteorological and related geophysical periodicals, serials, yearbooks, etc. as found in a dozen special libraries of East Germany. Holdings of each separate library through 1954 are indicated. Most series date since World War II (1939). Serials are arranged alphabetically by title under each of 53 countries as well as "International," and a title index is appended. *Subject Headings:* **1. Geophysical periodical lists 2. Periodical indexes 3. East Germany. I. Zentralstelle für Wissenschaftliche Literatur, Berlin.**—*M.R.*

## HISTORY

*See:* **Brit. summers of the past** (Lawrence), 8.5–143; **Hist. climates, Japan** (Arakawa), 8.5–147; **Hist. of anemometers** (Oliver), 8.5–152.

# APPLIED METEOROLOGY

## MARINE METEOROLOGY AND OCEANOGRAPHY

*See also:* **Mariner's met.** (Halpine, Taylor), 8.5-6; **Slopes of sea surface** (Cox, Munk), 8.5-17; **Atlas of thermal balance** (Budyko), 8.5-19; **Handbook of sea and ocean waves** (Bruns), 8.5-26; **Plan for Chilean oceanog. inst.** (Ihl Clérieus), 8.5-67; **Oceanographic courses at Lima Univ.,** 8.5-71; special bibliography on **Hydrologic Forecasting,** p. 657.

8.5–81 551.582.3

†U. S. Office of Naval Operations, **U. S. Navy Marine Climatic Atlas of the World, Vol. 1, North Atlantic Ocean.** Its *NAVAER* 50-1C-528, Nov. 1, **1955.** xvii p. 275 charts (in color), 31 refs. 50×34 cm. **DWB**—Monthly charts for the North Atlantic of frequency of surface wind direction and speed, of gales, visibility, low visibility, precipitation, cloudiness, wind and visibility and cloudiness; ceiling and visibility; temperature, wet bulb temperature difference and frequency of low pressure centers, plus seasonal charts of 850, 700, 500, 300 and 200 mb upper air winds (aid and retard), wind roses, height of pressure surface, upper air temperature and relative humidity; modified refractive index, inversions, height of tropopause, height of freezing level and potential aircraft icing frequencies are presented in this new atlas. Many of the charts show excellent planning and draftmanship, others, especially those giving combined frequencies of several elements or showing several elements on one chart are so complicated that they are difficult to interpret even with a magnifying glass. In some cases only the raw data, in minute tabular form, is placed on the map with respect to the appropriate ocean area or station. The isothermal or basic topography charts are very nicely done and the wind roses and temperature and humidity "bar charts" also are very presentable. Data were compiled from long records by means of machine tabulation from a million punched cards. Atlases for the oceans will be forthcoming. Ample textual information and annotations of the charts make the atlas a valuable tool for the aerologist or oceanographer who cannot obtain the data in any other well organized form. (For abstract of Inversion charts *see* 7F–211, June 1956, *MAB.*) *Subject Headings:* **1. Marine climatic atlases 2. Upper air atlases 3. North Atlantic Ocean. I. U. S. Weather Bureau.**—*M.R.*

8.5–82 551.5(26)(02) 551.46(02)

Great Britain, Meteorological Office, **Meteorology for mariners. With a section on oceanography.** London, H.M.S.O., **1956.** 274 p. 107 figs., tables. At head of t.-p.: M.O. 593. **DWB**—This book gives an outline of modern meteorology from the seagoing point of view. Pt. 1 deals with the usual meteorological elements. Pt. 2, Climatology, sets out the use made of ships' observations, Marsden squares and general climatology of the oceans. The next sections cover weather systems including tropical revolving storms, weather forecasting at sea, ocean surface currents, and ice. Finally Pt. 7, Oceanography, by J. N. CARRUTHERS is a complete three-dimensional treatment, covering physics and chemistry of sea water, topography and nature of ocean bottom, insolation and light penetration, marine biology, research vessels, variations of temperature and salinity with depth, and interrelations between sea and atmosphere. *Subject Headings:* **1. Marine meteorology 2. Oceanography 3. Textbooks. I. Carruthers, J. N.**—*C.E.P.B.*

8.5–83 551.46:532 551.46.018

Bowden, K. F., **Physics in oceanography.** *British Journal of Applied Physics,* 7(8):273–281, Aug. **1956.** 11 figs., 20 refs. **DLC**—This survey of "marine physics" deals first with waves. The piezo-electric bottom recorder, echo sounder and ship-borne recorder are described. Resolution of waves into harmonic components (wave spectra) is illustrated. Storm surges are next considered, with the example of the North Sea surge of Feb. 1, 1953. Wind-produced currents measured with the vertical log-current meter or by induced e.m.f. in the Straits of Dover are illustrated and elimination of tidal currents described. Measurement of ocean currents with towed electrodes or Loran, and rapid temperature surveys by bathythermograph, are illustrated by the Gulf Stream. Finally, measurement of turbulence with the Doodson current meter is shown. *Subject Headings:* **1. Oceanographic research 2. Oceanographic instruments.**—*C.E.P.B.*

8.5–84 551.5:551.4

†Deacon, G. E. R., **Physical oceanography.** *Science Progress*, London, 45(177):75–8(
Jan. 1957. 36 refs. **DWB**—After describing results of oceanographic surveys, autho
discusses work of CHARNOCK and others on energy interchange between atmosphere an
oceans. He then describes the systematic study of wave energy spectra and wave prediction
long waves and storm surges. Circulation of the oceans is taken up, first the surface current
and their relation to winds, and then tides and their meteorological disturbances. The articl
ends with a brief section on the sea floor and microseisms. *Subject Headings:* **1. Oceanograph
2. Energy exchange sea-atmosphere.**—*C.E.P.B.*

8.5–85 551.461:551.468(7

Fleming, Richard H. and Elliott, F. E., **Some physical aspects of the inshore environmen
of the coastal waters of the United States and Mexico.** *Geographical Journal*, London
122(4):456–465, Dec. 1956. 4 figs., 24 refs. **DWB**—The coastline is classified geomorpho
logically. Annual discharges of river basins are estimated; 75% enters the Atlantic, 25%
the Pacific. Annual range of sea temperature, and surface salinity, are shown. The effect
of winds, fresh water discharge and currents cause a much greater range of sea temperatur
on the Atlantic shore (>10°C) than on the Pacific (<5°C). *Subject Headings:* **1. Ocean
ographic surveys 2. Coastal waters 3. United States 4. Mexico.**—*C.E.P.B.*

8.5–86 551.573(267

*†Venkateswaran, S. V. (*Physical Res. Lab., Ahmedabad*), **On evaporation from the Indian
Ocean.** *Indian Journal of Meteorology and Geophysics*, 7(3):265–284, July 1956. 16 figs.
4 tables, 51 refs., 10 eqs. **DWB**—The main historical contributions to the subject of evapora
tion and energy exchange over the oceans from HALLEY (1686) to SVERDRUP (1951) and other
are reviewed in detail and interpretated critically in respect to conditions in the trade-winc
belt and especially that of the Indian Ocean. The sources of data, formulas used (modifie
Jacobs equation), the determination of the coefficient of evaporation K for the Indian Ocean
annual and seasonal distribution over Indian Ocean, annual average of Bowen's ratio R and
annual values of energy loss in cal/cm²/day by conduction (Qh) over the Indian Ocean (
charts in all); and annual values of total energy loss and excess of evaporation over precipitation
(6 charts), and latitudinal estimates of E-P for 0–30°N, are discussed and illustrated. I
drawing the seasonal charts of evaporation (E) and of E-P, JACOBS' (1951) charts have beer
used (modified for low latitudes where an overestimate of evaporation was made by JACOBS
according to the author). It is concluded that the main mode of energy transfer in the trade
region is in the form of latent heat. The adjustment of theoretical and indirect calculations
to direct aerological data is considered at some length. *Subject Headings:* **1. Evaporation ove
Indian Ocean 2. Energy exchange sea-atmosphere 3. Indian Ocean. I. Jacobs, W. C
**—*M.R.*

8.5–87 551.526.6(267

*Chacko, P. I., **Surface temperature of the coastal waters of Madras state during 1949–
1954.** *Science and Culture*, Calcutta, 21(8):458–459, Feb. 1956. table, 3 refs. **DLC**—
Average monthly 8 A.M. water temperatures at 1 fathom depth are tabulated for: 1) the
Arabian Sea (West Hill, Malabar Coast), 2) the southern part of the Gulf of Manaar (Tuti-
corin), and 3) the northern part of the Gulf of Manaar (Krusadai Island) for each of 6 years
(1949–1954). The temperatures at all 3 stations increase from Jan. to May, decrease to
July–Aug., increase again in Sept.–Oct. to a secondary maximum in Oct.–Nov. and then
decrease to Dec.–Jan., with an annual range of 4°–5°C. Absence of monsoon winds accounts
for spring increase in temperatures and turbulent mixing and water movements during mon-
soons for other variations. *Subject Headings:* **1. Sea surface temperature data 2. Arabian Sea
3. India.**—*M.R.*

8.5–88 551.526.6(261) 551.464(261)

Goedecke, Erich, **Über langjährige Temperatur- und Salzgehaltsanomalien im Ober-
flächenwasser der Irischen See.** [On long period anomalies of temperature and salinity in the

rface water of the Irish Sea.] *Deutsche Hydrographische Zeitschrift*, 9(3):121–132, **1956.** figs., 3 tables, 21 refs. German, English and French summaries p. 121. **DWB**—Mean nual values of surface temperature and salinity 1935–46 at 8 lightships or coastal stations ow positive anomalies in 1935, 1938–9, 1943 and 1945, negative in 1936 and 1940–42. Aver- ges of temperature 1905–50 and salinity 1909–50 are compared with those for the German ight which show a greater upward trend. The marked variations of temperature and salinity e attributed to changes in inflow of sea water and outflow of coastal water due to changes in ne prevailing wind direction and velocity and in the general weather type, including changes precipitation and runoff. *Subject Headings:* **1. Sea temperature variations 2. Salinity ariations 3. Irish Sea.**—*C.E.P.B.*

8.5–89 551.556:532.59:551.46 551.524:551.526.6

Fleagle, Robert G., **Note on the effect of air-sea temperature difference on wave genera- on.** *American Geophysical Union, Transactions*, 37(3):275–277, June **1956.** 3 figs., 9 refs., q. **DWB, DLC**—Observations from certain ocean weather ships are used to determine hether or not a certain observed wind speed in cold air (relative to sea temperature) leads higher waves than does the same wind in warm air. The problem is to eliminate possible orrelation between fetch and air-sea temperature difference. It is concluded that significantly igher waves are generated in cold air than in warm air, the difference amounting to roughly en per cent of the warm air values per degree Centigrade. *Subject Headings:* **1. Ocean wave eneration 2. Air-sea temperature difference effects.**—*Author's abstract.*

8.5–90 621.396.663

Gabler, Heinz and Gresky, Gerhard, **Schirmbildanzeige bei Sichtfunkpeilungen kohär- nter Wellen auf Schiffen.** [Indication of coherent waves on the screen of a cathode ray irection finder on a ship.] *Deutsche Hydrographische Zeitschrift*, 9(3):109–120, **1956.** 8 figs., tables, 2 refs., 19 eqs. German, English and French summaries p. 109–111. **DWB**—"The elations existing between the electro-magnetic force of a loop aerial and screen image of a win path cathode ray direction finder are derived and it is quantitatively investigated what nape coherent waves (waves of equal origin) used in radio bearing on board of ships will ake on the screen of such direction finders." As a rule pulsating ellipses are traced out, the reat axes of which do not indicate the direction of bearing. Two ways of separating the irect and sky waves and finding a bearing free from direction errors are indicated. *Subject leading:* **1. Radio direction finding.**—*From authors' abstract.*

8.5–91 551.468:532.593

Longuet-Higgins, M. S., **The refraction of sea waves in shallow water.** *Journal of Fluid Mechanics*, N. Y., 1(2):163–176, July **1956.** 5 figs., plate, 10 refs., 51 eqs. **DLC**—This aper considers the changes that occur in the character of short-crested sea waves when they re refracted by a shallowing depth of water. Besides a change in mean wave-length and direc- ion there is also a change (usually an increase) in the mean length of the crests. If the waves pproach obliquely they become skew, that is, the crests become staggered one behind another. When a short-crested sea is superposed on a long-crested swell, refraction tends to amplify he longer waves more than the shorter ones. This also produces an increase in the mean ength of the crests. Numerical examples are given. *Subject Heading:* **1. Shallow water aves.**—*Author's abstract.*

8.5–92 551.556:523.59:001.4

Poncelet, L., **À propos du "Ras de Marée" du 1er février 1953.** [Concerning the "Ras de Marée" of Feb. 1, 1953.] *Belgium. Institut Royal Météorologique de Belgique, Contributions*, No. 10, **1953.** 4 p. 6 foot-refs. **DWB**—"Ras de marée" means either a violent tidal current r a series of phenomenal waves, such as earthquake waves, traveling at 700–800 km/hr. he correct term for a storm tide is "marée d'ouragan"; it travels at only 30–50 km/hr. The eight of the North Sea storm tide on Feb. 1, 1953 (2.3 m above predicted high tide) agrees vith theoretical height due to a wind of 25 m/s. *Subject Headings;* **1. Tidal waves 2. Ter- minology 3. North Sea storm (1953).**—*C.E.P.B.*

8.5–93 551.556.8(267):551.4

*Venkataraman, K. S. (*Regional Met. Centre, Bombay*), **An analysis of the wave observations in the Arabian Sea.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(2):179–18 April **1956.** 6 figs., table, ref. **DWB, DLC**—A detailed statistical and graphical analysis o wave height and period observations made on ships in the Arabian Sea during the year 1952– a year without any storms and only one shallow depression (Dec. 1–5). A total of 517 observations, broken down by 5 squares, shows the highest frequency in the SE portion of th Arabian Sea, and the fewest in the N portion. Histograms of wave periods and heights fo wind speed groups (8–12, 13–17, 18–22, 23–27, and 28–32 knots), shows increasing height an period with increasing speed, but in the case of the lower speeds, the bulk of observations li above the theoretical maximum, whereas for high wind speeds and periods very few excee the theoretical. This is due to the effect of swell, lag from previous high winds and statistica necessity. Graphs show frequency of wave heights associated with different periods, an variations of wave-height and period with wind speed. *Subject Headings:* **1. Wave heigh and period statistics 2. Wind-wave relationships 3. Arabian Sea.**—*M.R.*

8.5–94 551.501.6:551.556.8:532.59

Walden, Hans, **Die Höhe der Windsee bei regionaler Zunahme der Windstärke in de Richtung mit dem Winde.** [Height of the wind-sea with increasing wind force in the directio of the wind.] *Annalen der Meteorologie*, 8(7/9):337–341, **1955/56.** 5 figs., 5 refs. **DWB DLC**—A diagram is constructed showing relation between wind fetch, increase of wind velocity (constant in time) with distance down-wind from calm, and wave height. A number of such cases with converging isobars were examined and found to fit the diagram. *Subject Heading* **1. Wind-wave relationships.**—*C.E.P.B.*

8.5–95 551.465(261):551.556.8

Defant, Albert (*Innsbruck Univ., Austria*), **Il recente sviluppo della teoria delle correnti marine.** [Recent progress in the theory of ocean currents.] *Geofisica e Meteorologia*, Genoa 4(1/2):1–6, Jan./April **1956.** 6 figs., refs., 2 eqs. **DWB**—Recent theories on the genera oceanic circulation derived from wind field and Coriolis force, and on the jet-like ocean currents (Gulf Stream, etc.) are reviewed (Munk, Neumann, Charney and others). The diagrams show schematic patterns of oceanic circulation, a circulation chart for the North Pacific based on observed values and a velocity cross section of the Gulf Stream halfway between Florida and Cape Hatteras (Charney). *Subject Headings:* **1. Ocean current theory 2. Wind driven currents 3. Gulf Stream.**—*G.T.*

8.5–96 551.465

Fofonoff, N. P. (*Pacific Oceanographic Group, Nanaimo, British Columbia, Canada*) and Montgomery, R. B. (*Johns Hopkins Univ., Md.*), **Equatorial undercurrent in the light of the vorticity equation.** *Tellus*, Stockholm, 7(4):518–521, Nov. **1955.** 2 figs., 6 refs., 10 eqs. **DWB, DLC**—The equatorial undercurrent, recently observed in the Central Pacific Ocean by Cromwell, Montgomery, and Stroup, is a narrow eastward current occupying the lower part of the surface layer at the equator. In the present study the undercurrent, treated as a permanent feature of the oceanic circulation, is found to be consistent with the conservation of absolute cyclonic vorticity in the equatorward flow comprising one segment of the meridional circulation. The continental barriers permit the formation of the longitudinal pressure-gradient component essential for the existence of the undercurrent. *Subject Headings:* **1. Oceanic circulation 2. Equatorial ocean currents 3. Equatorial undercurrent 4. Pacific Ocean.**—*Authors' abstract.*

8.5–97 551.46.018

Labeĭsh, V. G., **Izmerenie napravleniia poverkhnostnogo techeniia v otkrytom more.** [Measuring the direction of the surface flow in the open sea.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:55–56, Nov./Dec. **1955.** fig. **DWB, DLC**—A description with the aid of a diagram of a device for measuring the direction of a surface flow of currents used on a marine hydrometeorological station. It consists of a transparent piece of plexiglass 30×30 cm

ming a plane table upon which an azimuthal circle marked off from 0° to 360° has been nted, attached to the railings of a foot-bridge. The 0–180° line is parallel to the diameter the plane of the ship. In the center of the circle is placed a freely swinging arrow. A rrent meter is lowered from the plane table about one meter from the side of the vessel. determine the direction of flow the observer looks through the plane table and turns the ow so that it is parallel to the flow meter. The spherical angles of flow are then noted. e calculation of the flow is indicated with an appropriate formula. *Subject Headings:* **Flow meters 2. Current flow measurement.**—*I.L.D.*

8.5–98 551.556.8:551.465

Lineĭkin, P. S., **K teorii neustanovivshikhsia vetrovykh techeniĭ v glubokom more.** [heory of unstable wind currents in the deep sea.] *Akademiia Nauk SSSR, Doklady*, 6(1):47–50, Jan. 1, **1956.** fig., ref., 5 eqs. **DLC**—The development and establishment of rrents and the formation of density fields through the action of wind upon the surface of an homogeneous deep sea is investigated with the aid of a theoretical scheme of unstable wind rrents in a channel of infinite depth, bounded by perpendicular parallel walls; also it is sumed that the vertical density gradient, existing when the current originated, is uniform roughout the mass of fluid and that the wind does not vary with time and is irregular only the diameter of the given channel. In the hydrodynamic equation (Akad. Nauk, SSSR, klady, 101(5), 1955) P. S. Lineĭkin used in this study, the given components of wind rce $X$ and $Y$, and the horizontal projection of velocity $\bar{U}$ and $\bar{V}$ are represented by the terms a Fourier series for $\sin N\pi X$ and the remaining unknown magnitudes—vertical projection $W$, density $S$ and sea level by Fourier terms of the series $\cos N\pi X$. (*See also* 7.9–48 for rlier article by author.) *Subject Headings:* **1. Wind driven currents 2. Oceanography.** *I.L.D.*

8.5–99 551.465:551.556.8

†Neumann, Gerhard, **On the dynamics of wind-driven ocean currents.** *New York Univ. llege of Engineering, Meteorological Papers*, 2(4), Aug. **1955.** 32 p. 6 figs., 2 tables, 26 refs., eqs. **DWB**—Relationships between vertical density gradient, depth of current and age of rrent are studied in an attempt to explain observed flow of Gulf Stream and other ocean rrents. The present treatment assumes a steady state of wind generated mass transport an inhomogeneous ocean, on a spherical earth, with average density gradient and a rough ttom or uneven lower boundary to the current. If a fixed lower boundary were assumed, rongly unreal conditions would result. The slope of this level at no motion is shown to vary ith latitude (Coriolis force). Topography of this layer (after Defant) is shown on chart for . and S. Atlantic. Polar sea is a special case in which observed depths and slopes agree ith theory. *Subject Headings;* **1. Wind driven currents 2. Ocean current depths.**—*M.R.*

8.5–100 551.465:91.04(26)

Wüst, Georg (*Inst. für Meereskunde, Univ. Kiel*), **Stromgeschwindigkeiten im Tiefen- nd Bodenwasser des Atlantischen Ozeans auf Grund dynamischer Berechnung der *Meteor*-rofile der Deutschen Atlantischen Expedition 1925/27.** [Velocity of the deep and bottom ater current of the Atlantic Ocean on the basis of dynamic calculations from the *Meteor* oss section of the German Atlantic Expedition, 1925/27.] *Deep Sea Research*, Vol. 3, Supp. Papers in Marine Biology and Oceanography):373–379, **1955.** 9 figs., table, 32 refs., foot-fs. **DLC**—This new dynamic study of the "Meteor" profiles (German Atlantic Expedition, 925–1927) is based on the "dynamic reference surface" of Defant which admittedly is only first approximation. It is particularly concerned with the current velocities of the deep nd bottom water of the Atlantic Ocean. Selected transverse profiles, longitudinal sections nd charts indicate unexpectedly large measurable current velocities in the axis of the North tlantic Deep Current and of the Antarctic Bottom Current flowing along the foot of the ntinental slope off South America. On the average, these have a velocity of 9.2 and 7.2 m/sec, and reach maximal velocities of 17.4 and 12.5 cm/sec. These calculated current elocities are probably not too high because of the great distances between stations along the rofiles. The sources of error of the dynamic method are discussed. It appears reasonable o believe that a useful approximation has actually been determined. *Subject Headings:*

**1. Ocean current speeds 2. Deep ocean currents 3. "Meteor" Expedition, 1925–1927.** *Author's abstract.*

## GLACIOLOGY

*See:* **Greenland** (Ignat'ev), 8.5–13; **Arctic glaciers** (Sharp), 8.5–32; **Melting of Antarctic Glaciers** (Frantz), 8.5–36

## GEOMAGNETISM

*See:* **Symposium on geomagnetism, Bombay,** 8.5–62.

## AERONAUTICAL METEOROLOGY

*See also:* **Aeronautical statutes . . . ,** 8.5–207.

8.5–101 551.5:629.13

Bell, J. C. G. (*Sperry Gyroscope Co., Ltd.*), **Towards all-weather operation.** *Interavia*, Geneva, 9(4):228–229, **1954.** photos. **DWB**—All weather operation is essential for fighter planes and civil aircraft. Bombers are not so dependent on good weather for results. In spite of blind landings having been made since 1929 (Lt. J. H. Doolittle of U.S.A.A.F.), recent tests (14,000 straight ILS approaches with 400 ft–½ mile) show that 16% of attempts failed so the pilot had to overshoot, and with 400 ft and 1 mile, about 8% failed. Results at London Airport were much better than U. S. figures. Several systems are described and illustrated and the importance of good runway lighting is emphasized. *Subject Headings:* **1. All weather flying 2. Aircraft landing aids.**—*M.R.*

8.5–102 551.501.4:551.55:629.13

Browne, J. A. and Corwin, H. G., **TWA wind component scale.** *Trans World Airlines, Inc., K. C., Mo., Meteorological Technical Bulletin*, No. 56-2, Jan. 5, **1956.** 3 p. fig. **DWB**—A cross-wind and tail-wind component scale is presented for use in measuring winds in upper air charts or in computing wind components. The tail wind components from 0 to ±10 knots and the crosswind loss from 0 to 20 or 30 knots (if winds are >100 knots, halved reading are entered on chart and a special scale used for crosswind component) and angles for each 10° azimuth are represented on the scale. Examples of use are given. The wind component (equivalent tailwind) = tailwind component-crosswind loss. (The cross-wind component always results in loss.) *Subject Headings:* **1. Wind component scales 2. Aerial navigation aids.**—*M.R.*

8.5–103 551.501.4:551.556:629.13

Crutcher, Harold L. (*U. S. W. B., Asheville, N. C.*), **Route equivalent winds.** *American Meteorological Society, Bulletin*, 37(1):14–18, Jan. **1956.** 2 figs., 7 tables, 12 refs. **DWB DLC**—Route equivalent head wind is defined as "that uniform wind, which directed along a track at all points, results in the same average ground speed as that actually obtained." In this paper the author shows how point statistics of the U. S. Office of Naval Operations **Tables of winds and their aiding and retarding effect at 850, 700, 500, 300 and 200 mb** (*see* 6.8–73, 74, 75, Aug. 1955, *MAB*), can be used to provide route equivalent winds. The route from Oakland, California, to Rantoul, Illinois, has been selected for demonstrations and the procedure is described in detail. Tables give equivalent winds of points on this route for an aircraft speed of 300 knots, equivalent winds for selected percentiles on the given route, and route equivalent winds at selected percentiles for the Oakland-Rantoul route. *Subject Headings:* **1. Equivalent headwinds 2. Oakland-Rantoul air route.**—*I.L.D.*

8.5–104 614.8:551.551:629.135:061

Kirchner, Otto E., **Air safety: a report on the Sixth Annual Air Safety Seminar, held in Taxco, Mexico, Nov. 17–20, 1955.** *Aeronautical Engineering Review*, N. Y., 15(2):48–53, Feb. **1956.** photos. **DLC**—Among the subjects pertinent to air safety discussed at the

axco meeting was turbulence (of 102 passengers killed in scheduled operations in 1953–4, ırbulence accounted for 73% in 4 accidents). Air-borne radar has been used to bypass ırbulent thunderstorm areas by United Airlines (and other airlines). A condor was en-ountered at 19,000 ft by a USAF plane. Hail 5½ in. in diameter and weighing 1½ pounds as also been encountered. *Subject Headings:* **1. Air safety conferences 2. Turbulence azards to aircraft.**—*M.R.*

8.5–105 656.7(268)

Pedersen, Einar S. (*Technical Navigator SAS*), **Handelsluftfahrt in der Arktis.** [Commercial aviation in the Arctic.] *Polarforschung*, Ser. 3, 24(1/2):301–304, 1954, pub. **1956. DWB**—The first transarctic flight was by airship "Norge" in 1926. In 1946 the Scandinavian ir Traffic Company (SAS) planned stratocruiser flights and in Nov. 1952–May 1954 6 flights ere made over the Pole with passengers. Navigational and climatic difficulties are discussed. anding is difficult because of bad visibility due to drifting snow in winter and sea fog in ımmer, but there is no bumpiness and the polar air is good for men with weak nerves or high ood pressure. *Subject Heading:* **1. Trans-Arctic air navigation.**—*C.E.P.B.*

8.5–106 551.589:629.13 551.553.6

*Peterson, Erving N., **Selected ceiling-visibility-wind relationships at New York International Airport, New York.** Trans World Airlines, Inc., April 5, **1955.** 19 p. 12 tables. figs., 3 refs. **DWB**—Annual Baillie type wind rose is presented for all observations at llewild (1948–51), and for bad flying weather according to 5 ceiling-visibility categories. he worst conditions occur with winds from the S and SSW, but moderately bad flying weather so occurs with NNE, NE and ESE winds. Almost no occurrences of low ceiling and visiility are noted for winds from W to NNW. Seasonal trends are analyzed on graph and scussed. No diurnal analysis is attempted though records are based on hourly observations. ind direction and speed contingency tables are appended. *Subject Headings:* **1. Ceiling-sibility-wind data analysis 2. Wind frequency analysis 3. New York International Airrt (Idlewild).**—*M.R.*

8.5–107 621.396.663

Pietzner, Joachim, **Über sprunghafte Änderungen von Funkpeilen nach Consol-Funkuern bei Nacht.** [On sudden changes in radio direction finding indications of Consol stations night.] *Deutsche Hydrographische Zeitschrift*, 8(5):194–202, **1955.** 8 figs., 10 refs., 12 eqs. erman, English and French summaries p. 194–195. **DWB**—Regardless of their character radio range beacons Consol stations may be observed with a normal radio direction finder. sing a direction finder with loop aerial system it will be noticed—particularly when a cathode y direction finder is used—that by night during the dot-dash-period of the Consol transmisn different bearings for the dots and for the dashes are often observed. Hence, the operator the visual direction finder perceives sudden changes of the bearing indications occurring the dot-dash-rhythm. It is shown that this effect can be explained by the superposition the ground-wave and an anomalously polarized sky-wave, both being present at the place the direction finder. *Subject Heading:* **1. Radio direction finding.**—*Author's abstract.*

8.5–108 551.509.5:629.13

Woolcock, A. F., **Flying the "D value" in Australia.** *Australian Meteorological Magazine*, elbourne, No. 2:16–21, Dec. **1952.** 3 figs., 4 refs., eqs. **DWB**—The "D value" or "delta lue" is the difference between absolute altitude and pressure altitude of an aircraft. If dar altimeters are installed on a plane, the pilot can use the "D value" in navigation under rmal procedures over ocean surfaces or even fairly level land surfaces. Forecasts may be ade in terms of "D values" rather than expected winds. Some Australian forecast sections e this method to save time. Theory and relation of "D value" to constant pressure surfaces, bars and winds or drift of plane are set forth. Illustrations of flight plans and techniques determining "d values" are included. *Subject Headings:* **1. "D value" forecasts 2. Pressure ttern flying 3. Australia.**—*M.R.*

## AGRICULTURAL METEOROLOGY

*See also:* **Agromet. exhibitions** (Rudnev), 8.5–53; **Agromet. bibliog.** (Barger), 8.5–77.

8.5–109 551.509.59:6

Franken, Ernst, **Über den Landfunkwetterdienst und eine spezielle Beratung der Lanc wirtschaft durch die AMVB Hamburg.** [On rural radio weather service and a special advisor service for agriculture through the AMVB Hamburg.] *Germany. Deutscher Wetterdiens Mitteilungen*, 2(14):171–177, **1955. DWB**—This paper contains an account of the beginnin of rural radio weather broadcasts in north Germany after the last war, the preparatio of the weather forecast with special reference to its utility in various farming activitie and the preparation of special forecasts for agriculture of which several examples are give in an appendix. An example of a model numerical forecast and of its verification is presente *Subject Headings:* **1. Agrometeorological forecasting 2. Numerical forecasting 3. Norther Germany.**—*I.L.D.*

8.5–110 551.5:63:061.

†Germany. Deutscher Wetterdienst, **Die Agrarmeteorologen-Tagung in Frankfort a.M vom 14. bis 17. März 1955.** [The Agro-meteorological Conference in Frankfurt a.M. Marc 14–17, 1955.] Its *Mitteilungen*, 2(14), **1955.** figs., bibliogs. throughout. **DWB**—Thi conference was attended by all directors of the agro-meteorological services as well as b meteorologists of the German Weather Bureau. The papers delivered contain a comprehensiv survey of the activities and developments of agricultural meteorology in Germany and of th specific tasks of the individual branches of the agro-meteorological service. The individua reports are abstracted separately. *Subject Headings:* **1. Agrometeorological conference 2. Frankfort a.M., Germany.**—*I.L.D.*

8.5–111 633.11:551.524..

Mallik, A. K. and Subramanian, V. K. (both, *Met. Office, Poona*), **Flowering of wheat i relation to air temperature.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(2):173 178, April **1956.** 2 figs., 4 tables, ref. **DWB, DLC**—The year 1952 was better than 1953 longer vegetative period is conducive to greater height and higher yield, and optimum tim of sowing is Oct.–Nov.—the traditional time. However, in Poona the Nephad 4 wheat ca flower at any time of the year. Variations in air temperature during period of growth (mea maximum, mean minimum, average and diurnal range) are tabulated for each sowing. Mini mum temperature is main factor in determining length of vegetative phase, and maximun temperature shows poor correlation with time. Wheat was sown once every fortnight fron April 21, 1952, and height, data of flowering, grain yield and number of tillers for each sowing and yield per tiller calculated. *Subject Headings:* **1. Wheat yield 2. Temperature effects or crops 3. India.**—*M.R.*

8.5–112 551.585:631.9

Molga, Marian, **Problemy agroklimatologii w studiach nad rejonizacja produkcji rolnej** [Agroclimatological problems in studies relating to the regional distribution of agricultura production.] *Przegląd Geograficzny*, Warsaw, 27(1):81–101, **1955.** tables, 16 refs., eqs Russian and English summaries p. 99–101. **DLC**—The climatological task of dividing a area into separate agricultural regions should be carried out in 3 stages, according to the author In the first—the area is divided into climatic regions; the second is a study of plant require ments from the view point of climatic and soil conditions; in the third a detailed distributio of crops is worked out. After having described the existing analytical methods of climat study for the purpose of distribution of agriculture, and shown their disadvantages, the autho introduces his own agroclimatic index based on the amplitude of air temperature variations i the critical periods of plant development. *Subject Headings:* **1. Agricultural climatolog 2. Regional climatology 3. Climatic zones.**—*A.M.P.*

8.5–113 551.524:633.1

Nishiuchi, Hikaru (*Faculty of Agri., Naniwa Univ.*), **On the index of temperature climat at the limit of water rice crop culture in the world.** *Journal of Agricultural Meteorology*

Tokyo, 8(12):14–16, March 1953. fig., 27 refs. In Japanese; English summary p. 16. **DWB**—The index of temperature climate for the limits of paddy rice cultivations was determined on the basis of comparisons of the horizontal and vertical distributions of rice cultivations over the entire world. It was determined that the limiting mean air temperature for the warmest month is 20°C and the rice yield was safe in a region in which the cumulative temperature above 10°C is 3500°C during the growing season. *Subject Headings:* **1. Temperature relationships 2. Rice cultivation.**—*I.L.D.*

8.5–114 551.584.43:546.264:633.63

Reinau, E. H., **Schwellenwert der $CO_2$ in Luft der Grüngrenze eines Zuckerrübenschlages bei Gewitterregen.** [Threshold value of $CO_2$ in air at the leaf surface of sugar beets during a rainstorm.] *Deutsche Botanische Gesellschaft, Berlin, Berichte*, 67(2):44–47, March 25, 1954. fig., 5 refs. **DLC, DA**—An instrument for automatic, continuous $CO_2$ measurement was developed by Luft (Ludwigshafen, Germany) in 1942. It is based on the selective heat absorption by $CO_2$ and eliminates the delay in sampling inherent in other methods. With this instrument the author measured $CO_2$ content in a sugar beet field on 32 days (Aug./Sept. 1944) and also made simultaneous meteorological observations. A sample record is presented for a 24-hour period during which a rainstorm occurred, producing the lowest $CO_2$ value measured, 0.014%. During the night (Sept. 1/2) typical values around 0.052% were measured, while the daytime values (also typical for a cloudy day) were around 0.04%, as compared to 0.08% over a nearby meadow. The onset of rain was marked by an increase of $CO_2$, displaced from the soil by percolating rain water. *Subject Headings:* **1. Carbon dioxide apparatus 2. Leaf carbon dioxide data 3. Sugar beet.**—*G.T.*

## FOREST METEOROLOGY

*See also:* **Chestnut gall wasp dispersion** (Nitto, Tachibana), 8.5–238; **Forest destruction in Paraná** (Maack), 8.5–316.

8.5–115 551.571.3:632.187

MacHattie, L. B. (*Canadian Forest Res. Div.*), **Ramifications of relative humidity in forestry.** *Royal Meteorological Society, Canadian Branch*, [*Publications*], 6(5), Sept. 29, 1955. 13 p. tables, 10 refs. **DWB**—The author discusses the adsorption of moisture by wood under varying conditions of temperature and relative humidity and the significance of adsorbed moisture content of wood in inflammability and in forest protection. Quantitative data on the relationships between inflammability and duff moisture content are presented; practical methods of measuring the moisture content of duff are outlined. A system for the rating of fire danger is described. The relationships between adsorbed moisture and atmospheric relative humidity and the influence of air temperature, radiation, wind, heat evolved in adsorption of water vapor upon inflammability of duff, and the role of lakes in Canada in water adsorption by duff are considered. *Subject Headings:* **1. Humidity balance of wood 2. Fire danger rating.**—*I.L.D.*

8.5–116 551.509.5:551.515.4(796)

Small, Robert T., **Evaluation of 700 millibar data in thunderstorm forecasting in the Boise Fire-Weather District.** (In: U. S. Weather Bureau, [**Papers presented at the Fire Weather meeting, Portland, Ore., Feb. (March?), 1955.**] 5 p. 3 tables, 4 charts.) **DWB**—Objective tests made for cases resulting in no thunderstorms, and in thunderstorms in the western, the eastern, and the combined east and west sections of the region (S.E. Oregon, S. Idaho and W. Wyoming) respectively. During the 1953 and 1954 fire season (summer) thunderstorms occurred on 65% of the days in one or other or both (32% in both) sections. Tables of 700 mb temperature, dew point and T-Td difference between 10 pairs of stations in the west according to the several categories of thunderstorm activity, show that temperature and moisture at Boise, Medford and Oakland at 700 mb, show promise of giving good results. Many comments are made on relationships and their forecasting significance. *Subject Headings:* **1. Fire weather forecasting 2. Objective thunderstorm forecasts.**—*M.R.*

8.5–117 551.509.58:632.187 551.506:632.187:061.3

Schroeder, G. H. (*Asst. Chief Forester, Crown Zellerbach Corp.*), **Industrial forestry use of fire-weather information.** Paper presented to Western Fire Weather Service Annual Conference, Portland, Ore., March 8, 1955. (In: U. S. Weather Bureau, **[Papers presented at the Fire Weather meeting, Portland, Ore., Feb. (March?), 1955.]** 3 p.) **DWB**—The author estimates that in 1953 there would be 3 to 5 thousand forest fires, as Oregon alone had 2500 in 1952. Weather forecasts often have proved very accurate and useful in protection activities, and should be even more specific and accurate and should extend over 3, 10, 30 and 90 day periods, though 24 hour or less and 3 day forecasts are the critical ones. Common weather and protection radio frequencies such as set up by the Washington State Dept. of Conservation and Development, is a step forward. Anyone can listen to warnings or call in and ask for advice or weather reports on this or these frequencies. *Subject Headings:* **1. Fire weather forecasts 2. Forest meteorology 3. Pacific Northwest.**—*M.R.*

## INDUSTRIAL METEOROLOGY

*See also:* **Wind utilization** (Vinter), 8.5–239; **Icing of power lines** (Phillips), 8.5–253; **Evaporative cooling and room temp.** (Bacon), 8.5–302.

8.5–118 551.515.8:656.08

Horváth, László Gábor, **Az időjárásváltozások és az ipari balesetek.** [Weather changes and accidents in industry.] *Időjárás*, Budapest, 60(2):88–96, March/April **1956.** 5 tables, 6 refs. Russian and English summaries p. 88. **DLC**—The 604 accidents which occurred in 1954 in two great industrial plants in Budapest are investigated as to their connections with the passage of atmospheric fronts. A very close connection is found: frontal passages being linked to a remarkable accumulation of accidents during the time interval of ±36 hours, mainly in the case of persons with a weak nervous system. *Subject Headings:* **1. Frontal passage effects on accidents 2. Industrial accidents 3. Biometeorology 4. Budapest, Hungary.**—*Author's abstract.*

8.5–119 551.524.37:625.74(02)

†Jumikis, Alfreds R. (*Rutgers Univ.*), **Frost penetration problem in highway engineering.** New Brunswick, N. J., Rutgers Univ. Press, **1955.** 162 p. numerous figs., 7 tables, 64 refs., eqs. **DWB**—In Ch. 2 the natural factors affecting highway design are said to be 1) soils, and 2) climate (wind, precipitation, drought, floods, ground water, soil moisture, temperature and frost). These are discussed and effects illustrated. In Ch. 5, the steady state flow of heat and its effect on frost penetration and on pavements is considered theoretically and empirically. Effect of snow cover and other covers, clouds, sunshine, etc. produce departures from linearity as shown. Unsteady state heat conduction (Ch. 6) requires harmonic analysis but produces better approximations to real conditions. Sudden changes of temperature are treated in Ch. 7; F. NEUMANN's theory of ice formation and application to soil ice or freezing penetration in Ch. 8; J. STEFAN's solution (assuming a linear temperature gradient and motionless soil moisture) in Ch. 9; and upward motion of soil moisture in Ch. 10. *Subject Headings:* **1. Frost penetration in highways 2. Highway design 3. Climatic effects on soil freezing 4. Textbooks.**—*M.R.*

8.5–120 551.521.1:643.33

**Solar energy [from the Ford Foundation Report 1954, p. 62].** *American Meteorological Society, Bulletin*, 36(8):421, Oct. **1955. DWB**—A brief note on the pilot model of a new type of sun stove developed at the Engineering School of New York University. *Subject Heading:* **1. Solar heating.**—*I.L.D.*

## MEDICAL METEOROLOGY

*See also:* **Weather changes and accidents in industry** (Horvath), 8.5–118; **Climatic resorts, Swiss Alps** (Mörikofer), 8.5–313.

8.5–121 551.501.9:551.43 612.275.1

Gray, George W., **Life at high altitudes.** *Scientific American*, N. Y., 193(6):59–68, Dec. **1955.** 8 photos, table. **DWB, DLC**—The mechanisms attending high altitude adaptation

or lack of adaptation) are described and experiments conducted by the Institute of Andean Biology of the Univ. of San Marcos (founded in 1928) at their 3 laboratories, 1) at Lima (490 t), 2) at Huancayo (10,700 ft) and 3) at Morococha, Peru (14,900 ft) with a branch at San Nicolar mining camp (16,500 ft) are related. The San Nicolar Camp has a permanent population of 800, Morococha 8,000 and Hucancayo 27,000. The *reaction threshold* is 6–10 thousand t, the *disturbance threshold* 10,000 to 16,500 ft and the *critical threshold* for human life 16,500–16,000 ft. Oxygen balance, hemoglobin content, lactic acid, oxygen release to tissues, lung ize, etc. are studied for those going from sea level to high altitudes and vice versa, and for hose acclimatized from birth, for a month or so, and not acclimatized. Natives can do far nore work at 15,000 ft than sea level men can at sea level or when acclimatized to high altitudes. *Subject Headings;* **1. High altitude effects on man 2. Institute of Andean Biology 3. High ltitude laboratories 4. Atmospheric pressure effects on man 5. Morococha, Peru.**—*M.R.*

8.5–122 551.586:061.3

**Konferencja Bioklimatyczna w Inowrocławiu.** [Bioclimatic Conference at Inowroclaw.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 8(2):177–186, **1955. DWB, DLC**—Minutes f the conference held on May 27, 1954 organized by the Polish Meteorological and Hydro-ogical Society. The most important papers read at the meeting were ROJECKI, A.: **Problems f modern medical bioclimatology** and STENZ, E.: **Solar radiation and man.** *Subject Headings:* **. Bioclimatic conferences 2. Medical climatology.**—*A.M.P.*

8.5–123 551.586:612.014.43

Vowinckel, E., **Zur Klimaverträglichkeit der Südkontinente.** [Climate tolerance in the outhern continents.] *South Africa. Weather Bureau, Notos*, 3(2):98–103, **1954.** 4 figs., refs. **DWB**—Proceeding from D. BRUNT's experimentally established optimal temperature olerance by human beings, the author selects 13°C as the optimum temperature of olerance. The interval between the 13°C line and the curve for the sensation of "hot" ccording to BRUNT was divided on the warm side into 100 equally spaced lines so that a olerance curve was established for every combination of temperature and relative humidity. On the cold side the isolines were spaced at intervals twice as large as the former. Charts howing the tolerance of climate for the southern continents for specific months and seasons re presented. *Subject Headings:* **1. Heat tolerance 2. Heat effects on man 3. Southern ontinents.**—*I.L.D.*

## ARTIFICIAL RADIOACTIVITY IN ATMOSPHERE AND OCEAN

8.5–124 551.594.14

Schumann, G., **Künstliche radioaktive Produkte in der Atmosphäre.** [Artificial radio-ctivity in the atmosphere.] *Zeitschrift für angewandte Physik*, Berlin, 8(8):361–364, Aug **956.** 4 figs. 12 refs. **DLC**—The filter method of measuring radioactivity in the atmosphere s described in some detail; results of measurement made at Königstuhl (565 m elev.) near Heidelburg, Germany from March 1953 through May 1955 (in Micro-Micro-curies/$m^3$) using ylindrical $\beta$ counters with sensitivity of $10^{-14}$ cu/$m^3$ are shown on time graph; the method f beta determining time of explosion is described and illustrated graphically; maximum values re about 4-6$\mu\mu$ curies, well within the range of natural radioactivity, though showing up s sharp peaks against low background activity at the observation point. *Subject Headings:* **. Radioactivity in the atmosphere 2. Artificial radioactivity data 3. Filter radioactivity echniques 4. Königstuhl, Germany.**—*M.R.*

8.5–125 551.521.9:551.594.14(08) 551.521.9:639.2(08)

National Academy of Sciences, **The biological effects of atomic radiation: summary eports from a study by the National Academy of Sciences.** Wash., D. C., National Academy f Sciences—National Research Council, **1956.** 108 p. **DWB.** p. 45–70, Wexler, Harry, t al., **Summary report of the Committee on Meteorological Aspects of the Effects of Atomic**

**Radiation.** p. 71–84, Revelle, Roger, et al., **Summary report of the Committee on Effects of Atomic Radiation on Oceanography and Fisheries.** First report reprinted *Science*, Wash. D. C., 124(3212):105–112, July 20, **1956** (*see* 8.5–126, *this issue*). Second report reprinted *Ibid.*, 124(3210):13–16, July 6, **1956** (*see* 8.5–127, *this issue*). **DLC**—This publication summarizes results of first findings by 6 committees for study of biological effects of atomic radiation. Reports of the other committees on Genetics, Pathology, Agriculture, and Disposal of Radioactive Wastes are of peripheral interest. Names of the 14–16 members on each committee, and their affiliation, are listed with each report. *Subject Headings;* **1. Radioactive fallout effects 2. Biological effects of radioactivity 3. Radioactivity in ocean water 4. Collected works. I. Revelle, Roger II. Wexler, Harry III. National Academy of Sciences. Committee on Meteorological Aspects of the Effects of Atomic Radiation IV. National Academy of Sciences. Committee on the Effects of Atomic Radiation on Oceanography and Fisheries.**—*M.R.*

8.5–126 551.594.14:662.2:539.1

Wexler, Harry et al., **Meteorological aspects of atomic radiation.** *Science*, Wash., D. C., 124(3212):105–112, July 20, **1956. DLC**—The various mechanisms of propagation of radioactive debris originating in nuclear explosions are discussed. The principal cases analyzed are: (1) Close-in fallout from air bursts and from surface bursts; development of the atomic cloud and distribution of radioactivity within the cloud, and the prediction of close-in fallout. (2) Intermediate fallout and the effects of rain and turbulence upon it. (3) Delayed fallout, transport and diffusion in the stratosphere, mixing through the tropopause and tropospheric removal. Methods used for measuring and forecasting these factors are described and their limitations brought to attention. Among several special problems discussed are stratospheric storage of radiostrontium, contribution of civilian use of nuclear energy to radioactive contamination of the atmosphere, radioactive tracer techniques in atmospheric studies and the possible effect of atomic explosions on weather. *Subject Headings:* **1. Nuclear explosion effects 2. Radioactive fallout 3. Atomic explosion effects on weather. I. National Academy of Sciences. Committee on Meteorological Aspects of the Effects of Atomic Radiation.**—*G.T.*

8.5–127 639.2:539.1:551.464

Revelle, Roger et al., **Oceanography, fisheries, and atomic radiation.** *Science*, Wash., D. C., 124(3210):13–16, July 6, **1956. DLC**—General problems arising in connection with radioactive pollution of ocean water from nuclear tests, waste disposal and radioisotope tracer techniques, are discussed. The pollution danger from radioactive waste disposal is considered to be much more serious than that from weapons tests. A large-scale and world-wide program of reaearch into the structure of oceans and atmosphere is urged as a necessary basis for planning a way out of the already dangerous situation which was allowed to develop as a consequence of "what we now know was an unfounded confidence in the capacity of the atmosphere and the waters to absorb noxious substances." *Subject Headings:* **1. Radioactive waste disposal 2. Oceanic chemistry 3. Ocean-atmosphere interaction. I. National Academy of Sciences. Committee on the Effects of Atomic Radiation on Oceanography and Fisheries.**—*G.T.*

8.5–128 662.2:539.1:551.510.42

Wolman, Abel et al., **Disposal and dispersal of radioactive wastes.** *Science*, Wash., D. C., 124(3210):17–19, July 6, **1956. DLC**—Present and possible future problems of radioactive waste disposal and accident prevention are discussed. Fallout from weapons testing is not believed to constitute a serious public health hazard at present, but the ultimate fate of such material being unknown, and in view of the possibility of more extensive testing in the future, fallout remains a problem which should be studied on an international basis. *Subject Headings:* **1. Radioactive waste disposal 2. Radioactive fallout. I. National Academy of Sciences. Committee on Disposal and Dispersal of Radioactive Wastes.**—*G.T.*

# METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

## METHODS OF OBSERVATION

*See also:* **Weather for a hobby . . .** (Yates), 8.5–14; **Weather effects on radar** (Atlas et al.), 8.5–15; **Observer's handbook** (Gt. Brit. Met. Off.), 8.5–28; **Airborne radar photographs** (Harrison), 8.5–29; **New Mauna Loa Obs.** (Fox), 8.5–54; **Physical Met. Obs., Davos** (Mörikofer), 8.5–57; **Elec. current effects on magnetic instruments, Alibag Obs.** (Sohoni), 8.5–58; **Tower telescope, Göttingen** (ten Bruggencate, Jäger), 8.5–59; **Height of wind-sea** (Walden), 8.5–94; **TWA wind component scale** (Browne, Corwin), 8.5–102; **Route equivalent winds** (Crutcher), 8.5–103; **Life at high altitudes** (Gray), 8.5–121; **Upper air wind measurement** (aufm Kampe), 8.5–149; **Tornadoes, Black Sea** (Popov), 8.5–204; **Snow echoes at generating level** (Langleben), 8.5–256; **Mean rainfall estimates** (Neill), 8.5–257; **Potential gradient and thunderstorms** (Israël, Theunissen), 8.5–332.

8.5–129 551.501.1:551.594.22

Bottomley, G. A., **Observation of lightning.** *Weather*, 11(12):401, Dec. **1956. DWB**—Standing with his back to a window, author whirled a piece of white plastic flex in a vertical circle. During lightning, this showed an irregular series of radial positions, demonstrating multiple nature of lightning flashes. *Subject Headings:* **1. Observation techniques 2. Lightning discharges.**—*C.E.P.B.*

8.5–130 551.501.1:551.577 551.508.77

Hiatt, William E. and Schloemer, Robert W. (both, *U. S. W. B., Wash., D. C.*), **How we measure the variations in precipitation.** *U. S. Dept. of Agriculture, Water: the Yearbook of Agriculture*, 1955:78–84, pub. **1955. DA, DWB**—A general discussion of methods of measuring precipitation in the United States: nonrecording rain gages (10,000 stations), recording gages (3000), bucket surveys after unusual storms, snow measurement (300 stations and 1000 points on snow courses in west), radar coverage of a storm area, etc. Variation between gages of different types rarely exceed 5% but because of exposure as much as 50% when winds are 20 mph. Interpretation of records, kind, rate and duration, use of normals and frequencies in planning and in streamflow and flood forecasting studies, publications of U. S. Weather Bureau in this field and sources of additional published analyses (e.g., *MAB*), are discussed. Finally, application in agriculture and industry are mentioned. *Subject Headings:* **1. Precipitation measurement 2. Precipitation instruments 3. Rain gage exposure.**—*M.R.*

8.5–131 551.501.4:551.577.36

Essenwanger, Oskar, **Zur Verwendung eines logarithmischen Massstabes bei der Niederschlagsstatistik.** [On the application of a logarithmic scale in precipitation statistics.] *Meteorologische Rundschau*, 9(11/12):197–206, Nov./Dec. **1956.** 6 figs., 6 tables, 27 refs., 5 eqs. **DWB**—It is shown both formally and by examples of a number of German stations that a logarithmic scale is appropriate for rainfall frequency tables. Changing from a linear to a logarithmic abscissa gives a straight-line integrated probability curve. Uniform distribution is also obtained within logarithmic divisions. Further, if duration and intensity are normally distributed on a log scale, so must amount be. This is shown by examples. C. K. Stidd's cube-root distribution only applies to amounts $>1$ mm and offers no advantages. *Subject Heading:* **1. Rainfall frequency distribution.**—*C.E.P.B.*

8.5–132 551.501.4:551.507.362

Groves, G. V., **A rigorous method of analysing data of the rocket-grenade experiment.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):349–351, Nov. **1956.** 6 refs., eq. **DWB**—A method is described of calculating the separate contributions of wind and temperature in observations of rocket grenades bursting at N heights. *Subject Heading:* **1. Rocket grenade analysis.**—*C.E.P.B.*

8.5–133 551.501.4:551.573

Mezentsev, V. S., **Eshche raz o raschete srednego summarnogo isparenіia.** [More on the calculation of mean total evaporation.] *Meteorologiia i Gidrologiia*, Leningrad, No.

5:24–26, Sept./Oct. **1955.** 2 tables, 5 refs., 17 eqs. **DWB, DLC**—The author discusses analytically the various expressions developed by E. M. Ol'denkop, Budyko and N. N. Bagrov to express the relationship between the maximum possible total evaporation and heat energy resources. The formula of N. A. Bagrov in the form $x=\int_0^z \frac{dz}{1-(z/z_m)^n}$ was found to be more general. Its application to the Western Siberian lowland is illustrated. *Subject Heading:* **1. Evaporation calculations.**—*I.L.D.*

8.5–134 551.501.4:551.573(471.1)

*Niinivaara, K., **Evaporation from small catchment areas in Finland.** *Geophysica*, Helsinki, 5(2):78–94, **1956.** 11 figs., 3 tables, 7 refs., 2 eqs. **DLC**—A detailed analysis is made of the hydrological balance (soil moisture, precipitation, runoff and evaporation) of two small basins in Finland (Latosuonoja and Huhtisuonoja at 28°38′ to 42′E and 61°22′ to 24′N) from 1935–47, during the May/June, July/Aug. and Sept./Oct. periods, respectively. Since soil is saturated in May/June and Sept./Oct. the runoff can be considered as equal to $P-E$ (soil moisture does not vary from year to year in spring and fall). For the July and Aug. values, a more sophisticated formula is used, embracing the saturation deficit $(P=A+E+(R_A-B_A)+(R_E-B_E)$ where $(R_A-B_A)$ is the depletion of storage in soil by runoff, and $(R_E-B_E)$ by evaporation). *Subject Headings:* **1. Evaporation calculations 2. Hydrologic balance of small basins 3. Finland.**—*M.R.*

8.5–135 551.501.4:551.573

§†Täumer, Friedrich, **Eine Methode zur Bestimmung der Gebietsverdunstung auf meteorologischer Grundlage.** [A method of estimating areal evaporation on a meteorological basis.] *Leipzig. Karl-Marx-Universität. Institut für Agrarmeteorologie, Veröffentlichungen*, 1(1):1–71, **1955.** 12 figs., 19 tables, 63 refs., 18 eqs. **DWB**—A formula is developed for determining evaporation from an area on the basis of aerological data showing the amount of convergence or divergence through the boundaries of that area. In addition to humidity transport the formula comprises humidity changes and areal precipitation. The method is applied to the Spree basin by using data for 1938. Results are compared with those obtained by Kalweit (1954) by means of hydrological calculations, with considerable disagreement. The evaporation values obtained are also graphically correlated with atmospheric pressure, temperature, precipitation, synoptic situation, air mass type and fronts. *Subject Heading:* **1. Evaporation estimation.**—*G.T.*

8.5–136 551.501.45:551.510.42

Effenberger, Ernst, **Die Anwendung moderner Methoden der mathematischen Statistik zur Bearbeitung von Messreihen über den Verunreinigungsgrad der Luft.** [The application of modern methods of mathematical statistics to series of measurements of air pollution.] *Annalen der Meteorologie*, 7(7/9):342–352, **1955/56.** 6 figs., tables, 3 refs., eqs. **DWB, DLC**—Konimeter measurements of particle size at Hamburg are plotted as actual frequencies (20 classes), logarithms and residuals. Distribution of actual frequencies is far from normal, that of logarithms is nearly normal by statistical tests. Frequency histograms of temperature and wind force (normal) and relative humidity (not normal) are shown for comparison. Author then shows how analysis of variance and correlation can be applied to problems of persistence (week to week) and effect of wind direction. *Subject Headings:* **1. Computation methods 2. Atmospheric pollution studies.**—*C.E.P.B.*

8.5–137 551.501.45:551.579.1(569.4)

Goldschmidt, M. J., **Precipitation over and run-off from Jordan- and Litani catchments.** *Israel. Hydrological Service, Hydrological Paper*, No. 1, **1955.** 23 p. tables, 21 refs., eqs. **DWB**—The relation between long term (1935/6–1946/7) averages of precipitation and runoff was determined for suitable sites in the Litani and Jordan catchments, with corrections for disturbing factors including irrigated areas. Runoff $=0.90\ (P-360)$ where $P$ is the corrected average precipitation in mm/yr over the catchment. Evapotranspiration is given by $340+0.10\ P$. *Subject Headings:* **1. Runoff evaluation 2. Rainfall-runoff relation. 3. Israel.**—*C.E.P.B.*

8.5–138 551.501.45:551.594.7

Hall, W. M. (*Raytheon Manufacturing Co., Wayland, Mass.*), **Prediction of pulse radar erformance.** *Institute of Radio Engineers, N. Y., Proceedings*, 44(2):224–231, Feb. 1956. ) figs., 15 refs., 14 eqs. **DLC**—Attenuation factors, including effects of weather (cloudbursts, eavy rain, moderate rain, light rain and fog) are considered in prediction formulas for pulse adar range performance, and nomograms are included for calculating these factors and effects $O_2$, water vapor and temperature, at wave-lengths of 0.3 to 10 cm. Reflection coefficients om rain according to HADDOCK (exact) and RAYLEIGH (approximate) are also considered r fluctuating targets (0.9–10 cm). *Subject Headings:* **1. Pulse radar performance prediction Atmospheric attenuation by weather.**—*M.R.*

8.5–139 551.501.45:551.579.1

Learmonth, J. R. (*Univ. of Tech., N.S.W.*), **An automatic integrator for the calculation excess rainfall.** *Institution of Engineers (of) Australia, Sydney, Journal*, 26(10/11):230–233, ct./Nov. **1954.** 6 figs. (incl. photos), table. **DLC**—Excess rainfall is, in essence, that ortion of rainfall which causes run-off. If the rate of rainfall, $p$, and the maximum rate of ss, $\phi$, are known at every instant during a storm, the excess rainfall is calculated by in- grating $(p-\phi)$ over that portion of the storm when $p$ is greater than $\phi$. This instrument lows rapid and accurate calculation of excess rainfall, using the original traces from recording uviometers, and assuming a constant maximum rate of loss, $\phi$, over the duration of the orm. *Subject Heading:* **1. Runoff evaluation.**—*Author's abstract.*

8.5–140 551.501.6:551.521.11

Reidat, Rudolf, **Arbeitsblätter zur Ermittlung des Sonnenstandes und der Besonnungs- auer.** [Diagrams for determining the sun's altitude and azimuth and the possible duration sunshine.] *Annalen der Meteorologie*, 7(7/9):321–337, **1955/56.** 11 figs., 2 tables. **DWB, LC**—The altitude and azimuth of the sun were computed for every hour at 10-day intervals r latitudes 48, 50, 52 and 54°, and shown in a series of diagrams (with equation of time). hen follow diagrams for calculating astronomical duration of sunshine, showing sun's height d track marked at hourly intervals. Instructions for use are included. Finally, 3 diagrams ustrate construction of silhouettes of the horizon, to show the effect of obstructions, and the uration of sunshine on walls and windows. *Subject Heading:* **1. Sunshine duration diagrams.** *C.E.P.B.*

8.5–141 551.501.6:551.521.3

Santomauro, Luigi, **Un metodo sistematico d'impiego del nomogramma di Elsasser nella cerca della variazione di flusso.** [A systematic method of using the Elsasser nomogram in search on variations in radiative flux.] *Rivista di Meteorologia Aeronautica*, Rome, 15(1): 9–52, Jan./March, **1955.** table. French, English and German summaries p. 49. **DLC.** Also in: Italy. Servizio Meteorologico dell'Aeronautica, **Il Servizio Meteorologico dell'Aero- nautica Italiana alla x Assemblea Generale I.U.G.G.,** Rome, **1954.** p. 71–74. table, eq. nglish summary, p. 71.) **DWB.** Also French version: **Une methode systématique d'emploi i nomogramme d'Elsasser pour la recherche de la variation du flux.** *I.U.G.G. Association Meteorology, Rome, Sept. 1954, Scientific Proceedings*, p. 554–555, publ. London, **1956. WB**—A method of utilization of the Elsasser nomogram for a systematic research on flux riations at the surface and at the altitudes of 900, 850, 800 and 700 mb, and of the character- tics inherent to inversions and isothermal layers. Some discrepancies are also mentioned, hich seem to reveal a relation between flux variation and air masses stability. *Subject eadings:* **1. Elsasser radiation diagram 2. Radiation flux.**—*Author's abstract.*

8.5–142 551.501.7:551.510.3:551.510.53:551.508.95

Friedland, Stephen S.; Katzenstein, Jack and Zatzick, Michael R. (all, *Dept. of Physics, niv. of Connecticut*), **Pulsed searchlighting the atmosphere.** *Journal of Geophysical Research*, Vash., D. C., 61(3):415–434, Sept. **1956.** 16 figs. (incl. photos), 9 refs., 6 eqs. **DLC**—An otical pulsed searchlight system has been developed for measuring the density profile of the pper atmosphere. A light source which emits a 50-megalumen pulse, 20 μsec in duration, placed at the focal point of a 60-inch mirror. A photomultiplier, which is part of a log-

arithmic recording system covering a dynamic range of four orders of magnitude, is place at the focal point of a similar mirror. Each time the light is pulsed, an entire density profil is obtained. An altitude above 40 km has been observed. Suggestions and methods fc obtaining signals from higher altitudes are discussed. The data obtained to date agree wit the results of previous investigators and theoretical calculations. *Subject Headings:* **1. Search light techniques 2. Upper atmosphere density measurement 3. Searchlights.**—*Author's abstract.*

## OBSERVATIONAL DATA

*See also:* **Aerological obs., Germany** (Holzapel), 8.5–21; **Upper air wind data, Mawson** (Dingle), 8.5–35; **Use of fire-weather information** (Schroeder), 8.5–117; **Weather of 1955** (Klein), 8.5–199.

8.5–143 551.506:902(42

Lawrence, E. N., **British summers of the past.** *Weather*, London, 11(7):223–227, July **1956.** 2 figs. **DWB**—Account of historical summers back to Aug. 30, 55 B.C. (violent gale) Singled out for special mention are the hot dry summer of 1783, with synoptic charts for Jun 22 and 23, when there was a fog of volcanic dust, and the cold very wet "summer" of 176 (rainfall for England and Wales, June through Sept., 174% of normal). *Subject Headings* **1. Historic weather records 2. England.**—*C.E.P.B.*

8.5–144 551.506.1(994

*Falkland Islands. Meteorological Service, **Meteorological observations taken at Stanley Falkland Islands, 1875–.** Latest seen, **1948.** Excerpted from the **Annual Report** of the Colonial Government. Observations first published 1875 (see **Blue Books**); interrupted 1884–1903, and again 1915–1921. Title varies. 1947 issue, 1 sheet, folded, with title **Annual meteorological table, Stanley, Falkland Islands.** 1946 issue, 1 sheet, title **Meteorological Observations. DWB** (broken), **GB-MO, GB-Sci.M.** (broken)—For observations 1951– see its **Annual Meteorological Tables, 1951–.** (*See* 5.1–46, Jan. 1954, *MAB.*) (Following abstract is on the 1946, 1947 issues.) Standard monthly and annual mean or extreme values of pressure, temperature precipitation, vapor pressure, relative humidity, cloud amount sunshine, weather, wind direction (16 points) and wind force (4 categories) and mean wind speed at noon GMT. *Subject Headings:* **1. Annual meteorological reports 2. Climatic data 3. Falkland Islands.**—*M.R.*

8.5–145 551.506.3

U. S. Weather Bureau, (*National Weather Records Center, Ashville, N. C.*), **Inventory of master punched card library, December 14, 1955.** [1956]. [11] p. Typescript. **DWB**—A complete inventory of nearly 300 punched card decks deposited at Asheville National Weather Records Center. The total number of cards in each deck are listed after the name of the deck. The sizes range from 1000 cards to 36 million for USWB forms 1009 (1948-date), and >51 million for WBAN hourly surface observations (1948–). The overall total is nearly 300 million, and the areal coverage involves most of the world. *Subject Headings:* **1. Punched card deck inventories 2. U. S. National Weather Records Center 3. Asheville, N. C.**—*M.R.*

8.5–146 551.506.5(661)

Richter, Nikolaus, **Zum Beitrag der deutschen Wissenschaft an der Erforschung der zentralen Sahara in neuerer Zeit.** [Contribution of German science to the investigation of the central Sahara in recent times.] *Forschungen und Fortschritte*, 30(12):353–360, Dec. **1956.** 6 figs., table, 9 refs. **DLC**—Desert investigation is a complex of climatology, meteorology and hydrology and in recent years microclimatology, evaporation, radiation balance and even paleoclimatology. How powerful weathering can be is shown by the wind-excavated depression of Kharga Oasis, 180 km long, 50 km wide and nearly 400 m deep. Knowledge has been extended by German expeditions to Fezzan (S. Libya) in 1933, 1937, 1942/3 and 1954/5. The two latter are described and routes shown. In 1954/5 L. RICHTER carried out a series of meteorological observations, including evaporation and water balance, radiation, polarization and earth temperatures. Topographic, hydrographic and microclimatic studies were made

n the volcano Wau en-Namus. *Subject Headings:* **1. Expeditions 2. Sahara Desert.**—*E.P.B.*

8.5–147 551.506.8(52):551.583.2

Arakawa, H., **Climatic change as revealed by the blooming dates of the cherry blossoms Kyoto.** *Journal of Meteorology*, 13(6):599–600, Dec. **1956.** fig., 2 tables, 3 refs. **DWB**—ecords at Kyoto (35°N, 136°E) since 9th century indicate colder springs from 11th through 4th and in 16th Centuries. The average date was 4½ days later than in remaining periods, nd the difference is probably statistically real. *Subject Headings:* **1. Historical climates Phenological data 3. Japan.**—*C.E.P.B.*

8.5–148 551.506.8:551.524.4

Prokaev, V. I., **Termicheskie anomalii v dolinakh Zhigulevskikh gor.** [Thermal anoalies in the valleys of Zhiguli Mountains.] *Priroda*, Moscow, 44(11):89–91, Nov. **1955.** photos. **DLC**—During the course of a phenological survey through the Zhiguli Mountains, uring the spring of 1950, the size of linden and maple leaves on mountain slopes did not vary ith elevation or exposure but in the V-shaped valleys, the size of the bases was considerably naller. The retardation of phenological phenomena in the Zhiguli mountain valleys is ssociated with a temperature inversion caused by the sinking of cold dense air from the ountain sides to the valleys and by cooling caused by snow accumulation. Photographs f the region showing the valleys and vegetation are reproduced. *Subject Headings:* **1. Temerature inversions 2. Phenological observations 3. Zhiguli Mountains, U.S.S.R.**—*I.L.D.*

## INSTRUMENT CARRIERS

*See also:* **Rocket exploration during IGY** (Kaplan), 8.5–41; **Rocket and satellite studies during IGY** (Kaplan), 8.5–42; **Rocket-grenade data analysis** (Groves), 8.5–132; **New airborne radar** (Holahan), 8.5–158.

8.5–149 551.501.7:551.557:551.507.362

aufm Kampe, H. J., **Upper-air wind measurements with small rockets.** *Journal of Meteorology*, 13(6):601–602, **1956. DWB**—Preliminary experiments are derived using powerful ut inexpensive *Loki* rockets to carry ½–1 lb of chaff to 90,000 ft, where it can be followed by adar. A metallized parachute ejected from a rocket is also suggested. *Subject Headings:* **. Upper air wind measurement 2. Rockets.**—*C.E.P.B.*

## INSTRUMENTS

*See also:* **Handbook for lab. work in met.** (Kachurin), 8.5–7; **Airborne radar photographs** (Harrison), 8.5–29.

8.5–150 551.508:53.082.7

Geselle, P. and Matzke, H., **Über Registrierversuche mit elektrischem Strom.** [On ecording experiments with electrical currents.] *Zeitschrift für Meteorologie*, 10(9):278–280, Sept. **1956.** fig. **DLC**—Paper saturated with calcium chloride and glycerine in water gives good black record when a current is passed through it from a fine stainless steel pen, if the luctuations are not too rapid and humidity not too low. Other mixtures give red (not permanent) and green. The device can be used for recording instruments in a screen or with a adiosonde. *Subject Headings:* **1. Electric recorders 2. Recording equipment.**—*C.E.P.B.*

8.5–151 551.508.21

Hinzpeter, Hans, **Über die Repräsentanten der Angström-Skala und der Smithsonian-Skala des Observatoriums Potsdam.** [On the equivalence of the Angström and Smithsonian cales at Potsdam Observatory.] *Zeitschrift für Meteorologie*, 10(9):257–263, Sept. **1956.** figs., 4 tables, 11 refs. **DLC**—The ratio between the Angström and 1913 Smithsonian yrheliometer scales was taken as 103.5:100, but comparisons at Potsdam in 1930 gave 1.038 nd in 1952–54 1.051. The differences are attributed to changed methods of comparison;

the standard silver disk S.I. 12 and Angström 140''' have probably remained constant. Th silver disk pyrheliometer probably has a temperature coefficient of +0.4% per degree. *Subjec Heading:* **1. Pyrheliometer corrections.**—*C.E.P.B.*

8.5–152 551.508.53/4(09

Oliver, J., **An early self-recording pressure-plate anemometer.** *Weather*, 12(1):16–21 Jan. **1957.** 5 figs., 6 refs. **DWB**—A brief history of anemometry is given, with specia reference to the pressure plate (first described by Leonardo da Vinci about 1500). W. Ed MOND's recording pressure plate anemometer (1836, reported to Royal Institution of Soutl Wales in 1837) is described in detail with diagrams, and record for May 8, 1839. *Subjec Headings:* **1. Anemometers 2. History of anemometers.**—*C.E.P.B.*

8.5–153 551.508.5

Walker, R. E. and Westenberg, A. A. (both, *Applied Physics Lab., Johns Hopkins Univ.*) **Absolute low speed anemometer.** *Review of Scientific Instruments*, Lancaster, Pa., 27(10) 844–848, Oct. **1956.** 5 figs. (incl. photos), table, 10 refs., 4 eqs. **DWB, DLC, DGL**—An absolute anemometer suitable for measurements in gases under a wide variety of condition is described. The instrument, based on an idea first used by KOVASZNAY, utilizes the tem perature fluctuations in the wake of a sinusoidally heated fine wire as tracer. A second hot wire detects the fluctuations, and the phase change between two successive positions of thi wire can be used to determine the free stream velocity. The technique is shown to have good spatial resolution and an accuracy better than 2% in the velocity range 40–400 cm/sec Sources of error and various experimental conditions are discussed in detail. *Subject Heading* **1. Hot wire anemometers.**—*Authors' abstract.*

8.5–154 551.508.762(02)

Canada. Meteorological Div., **Ceiling projectors and associated equipment.** Its *Cir.* 2676, Ins. 67; Instrument Manual, No. 70, July 6, **1955.** 35 p. 13 figs. **DWB**—A manual for use in installation, maintenance and observation with vertical and with inclined beam ceiling projectors. Equipment, wiring, lamps, alidade, etc. are described in detail and illustrated. *Subject Headings:* **1. Ceiling projectors 2. Instrument manuals 3. Instructions for observers.**—*M.R.*

8.5–155 551.508.77

Volokh, V. G., **Sravnenie rezul'tatov pokazaniĭ dozhdemera i osadkomera Tret'iakova po materialam seti stantsii.** [Comparison of results obtained with the rain gage and precipitation gage of Tret'iakov on the basis of station records.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 34(96):41–57, **1952.** 5 figs., 15 tables. **DLC**—The precipitation gage of Tret'iakov provides greater protection against turbulence and better prevents the blowing out of snow from the container or the drifting in of snow. The results of comparisons of precipitation by the Tret'iakov gage and the ordinary rain gage are presented and analyzed statistically. Data are presented on the deficiency in solid precipitation during the winter months and deficiency of precipitation on days with snow storms as measured with a rain gage, mean difference between the precipitation and rainfall gage as a function of precipitation amount and wind velocity, the frequency distribution of differences between the two types of gages for solid precipitation and summary of differences for fluid precipitation. The calculation of a coefficient of conversion from precipitation to rainfall gage is calculated and the calculated corrections are given in a table. *Subject Headings:* **1. Rain gage comparisons 2. Precipitation gages 3. Tret'iakov's precipitation gage.**—*I.L.D.*

8.5–156 551.508.822:621.396.61

Mathur, L. S.; Dhar, N. C. and Bhattacharya, H. S. (all, *Met. Office, New Delhi*), **A method of telemetering chronometric radiosonde data through rawin channel.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(2):165–171, April **1956.** 6 figs., 4 refs. **DWB, DLC**—The paper describes a method of telemetering chronometric radiosonde data on the F-M channel of the receiver of the radio-theodolite. A squegging oscillator is used in conjunction with the chronometric radiosonde to obtain F-M signals from the 400 Mcs rawin

ansmitter at each contact of the meteorologically sensitive pens with the contacting helix of e radiosonde. With the ground-based rawin receiver an auxiliary electronic unit is used to rk the radiosonde recorder, whenever the F-M signals are picked up by the radio-theodolite ceiver. The details of the balloon borne unit and auxiliary equipment are also described. *bject Heading:* **1. Radiosonde transmitters.**—*Authors' abstract.*

8.5–157 551.508.822:551.547:551.524

Pauly, E., **Die Genauigkeit der nach der Hergesell-Kleinschmidtschen Formel berechten Temperaturkorrektion für Luftdruckmessungen der Radiosonde H 50.** [Accuracy the temperature correction for atmospheric pressure measurements of radiosonde H 50 lculated according to the Hergesell-Kleinschmidt formula.] *Germany. Deutscher Wetterenst. Instrumentenamt Nord, Hamburg, Technische Mitteilungen, New Ser.*, No. 1:29–43, 55. 5 figs., 6 tables, 7 refs., 16 eqs. **DWB**—Having discussed separately the questions of: the determination of the compensation pressure p/k of an aneroid; 2) the pressure correction atmospheric conditions; 3) the accuracy of the computed pressure correction; 4) the accuracy the air pressure indication; 5) the total dispersion of the corrected air pressure and 6) temrature-compensated aneroids, the author comes to the conclusion that: 1. The correction temperature effect of aneroids and transmission mechanisms results in a small rectification the dispersion error of the pressure figures. An improvement is however noticeable. 2. The spersion of corrections after pressure calibration on the basis of computations according to ergesell-Kleinschmidt or through the building of a compensation member—are almost the me. 3. The smallest errors occur by pressure measurements although the loss remains nsiderable. 4. The mathematical method implies certain complications for the evaluation the ascent. The method of determining compensation pressure is quite simple. 5. A echanical compensation member makes any computation unnecessary. However the corction follows a complicated arrangement, which requires temperature and pressure changes. herwise the measurement errors would rise for the whole pressure area. 6. By the calculation compensation pressure of the pressure element the mean factor $\alpha$ should be considered. this way it will become possible to indicate the value p/k without having in hand the pressure ge curve. *Subject Headings:* **1. Temperature effects on radiosondes 2. Pressure measureents 3. Radiosonde errors.**—*A.M.P.*

8.5–158 551.508.85:551.507.352

Holahan, James, **New airborne weather radar to make debut.** *Aviation Age*, N. Y., (1):46–53, Jan. **1956.** 8 figs. (incl. photos). **DWB**—Details, with many photos of new -Band equipment to be used in commercial airplanes (manufactured by Collins Radio Co., allas, Tex.). One important feature is optional contour display circuit to help pilot avoid rbulence by iso-echo techniques which black out areas of high rainfall, leaving narrow nicks white between dark centers of heavy rainfall, indicating areas of steep gradients. These eas are where turbulence is greatest. *Subject Headings:* **1. Airborne weather radar 2. Conur display radar 3. Iso-echo turbulence indicator.**—*M.R.*

## SYNOPTIC ANALYSIS AND FORECASTING

*See also:* **Studies in synoptic climatology** (Sellers), 8.5–1; **Flying the "D value"** (Woolcock), 8.5–108; **Rural radio weather service** (Franken), 8.5–109; **Evaluation of 700 mb data** (Small), 8.5–116; **Use of fire-weather information** (Schroeder), 8.5–117; **Linear flow stability** (Palm), 8.5–192; **Aeronautical statutes,** 8.5–207; **Derivation of infiltration indices, Australia** (Laurenson), 8.5–289, special bibliography on **Hydrologic Forecasting,** p. 657.

8.5–159 621.397.9:551.509.2

Cowling, George A., **TV weatherman.** *Weather*, 12(1):22–26, Jan. **1956.** 2 photos. lso: True, Dan., **Television weathercasting in the United States.** *Ibid.*, p. 26–27. 2 photos. **WB**—G. A. COWLING, one of the Meteorological Office staff engaged in presenting television recasts, gives a popular account of the evolution of the program, first televised on 29 July 949. The preparation is described; at the end it is rather a rush! In U.S.A. the weather

programs are "commercials"; some are in color. *Subject Heading:* **1. Television weathe broadcasts.**—*C.E.P.B.*

8.5–160 551.509.31(213

Bath, A. T. (*Brisbane Divisional Met. Office*) and Gibbs, W. J. (*Central Met. Bureau Melbourne*), **Synoptic analysis in the tropics.** *Australian Meteorological Magazine*, Melbourne No. 12:22 41, March **1956.** 12 figs., 6 refs., 2 eqs. **DWB, DLC**—The deficiencies of isobari and frontal analysis in low latitudes are explained and a method of synoptic analysis usin streamlines is suggested. Isogon analysis is described and recommended for limited applica tion. Some relationships between streamlines and hydrometeors are discussed. *Subjec Headings:* **1. Synoptic analysis 2. Tropical weather forecasting.**—*Authors' abstract.*

8.5–161 551.509.31

Hollmann, G., **Zur Bedeutung der Tendenzgleichung für die Interpretation synoptische Luftdruckänderungen.** [On the importance of the tendency equation for the interpretatio of synoptic pressure changes.] *Meteorologische Rundschau*, 9(11/12):194–197, Nov./Dec **1956.** 5 refs., 28 eqs. **DWB**—The still widespread idea that the seat of ground level pressur variations of synoptic fields is in the upper troposphere is a non-permissible dynamic inter pretation of the tendency equation. It is shown by a simple analytical model that the surfac pressure change calculated by equating to zero the wind divergence integrated over the whol column is greater than the deficit of mass suggested by the tendency equation. This parado shows that for a pressure fall (rise) the excess of divergence (convergence) in an air colum is not decisive, and it is explained by the quasi-geostrophic nature of air movements considere synoptically, in that the wind divergence depends on the vorticity equation, i.e., the divergenc of the Brunt-Douglas isallobaric wind. For pressure changes synoptic in space and time processes in the same layer gave the first approximation. *Subject Heading:* **1. Barometri tendency equation.**—*Trans. of author's abstract.*

8.5–162 551.509.312:518.

Saxton, David W. (*Weather Forecasting Research Center, Chicago*), **An experiment in graphical forecasting based on two baroclinic models.** Chicago Univ. Dept. of Meteorology. Contract AF 19(604)-1293, Scientific Report No. 11, July **1956.** 27 p. 12 figs., 5 tables 6 refs., 18 eqs. **DWB**—The effects of static stability and varying smoothing interval on the results of graphical integrations are discussed in connection with two prediction models devel oped by Estoque (1955, 1956). Experimental forecasts of a major storm development indicated that the static stability pertaining to the standard atmosphere gives satisfactory results, and that a smoothing interval of about 1000 km is preferable. With such large smoothing interval the formula for recovering the height changes becomes much simplified *Subject Headings:* **1. Numerical forecasting techniques 2. Graphical integration 3. Baroclini models.**—*Author's abstract.*

8.5–163 551.509.317:551.515.1

Clarke, R. H. (*Central Met. Bureau, Melbourne*), **A study of cyclogenesis in relatio to the contours of the 300 MB surface.** *Australian Meteorological Magazine*, Melbourne No. 12:1–21, March **1956.** 14 figs., table, 16 refs. **DWB, DLC**—A study has been made o five selected synoptic sequences involving the development and decay of cyclones in th Australasian area, with a view to estimating the relationship between surface development and the form of the 300 mb contours. Some generalizations on this relationship appea plausible. A noteworthy correlation was obtained between surface cyclogenesis and vorticit advection at 300 mb. *Subject Headings:* **1. Cyclogenesis 2. Upper air analysis 3. Vorticit computations.**—*Author's abstract.*

8.5–164 551.509.33:551.577.33(794

Lane, Gerould T., **Cycles in rainfall at Santa Barbara, California, 1867/68—1954/55** *Cycles*, N. Y., 7(1):17–20, Jan. **1956.** 5 charts. **DWB**—The annual rainfall record of Sant Barbara is graphically analyzed for cycles of various periods. On account of the shorte cycles (2, 3 and 5.2-year periods) increased rainfall is expected for 1955/56 and 1956/57. Th

nger waves indicate higher average precipitation for the next ten years. *Subject Headings:* **Rainfall cycles 2. Long range forecasting 3. Santa Barbara, California.**—*G.T.*

8.5–165 551.509.33

Reuter, Heinz, **Über die Voraussage zeitlich gemittelter Höhenkarten für Zwecke mittelistiger Wetterprognosen.** [Forecasting time-averaged upper air charts for medium-range eather forecasts.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(4):433–38, **1957.** 3 refs., 6 eqs. German, English and French summaries p. 433-434. Also: letter, Leopold, **Grenzen der Anwendbarkeit und Erweiterung der Trendmethode von amias.** [Limits of application and extension of the Namias trend method.] *Ibid.*, p. 39–445. table, 4 refs., 22 eqs. German, English and French summaries p. 439–440. **DWB** — EUTER suggests an improvement in NAMIAS' trend method of 3-day forecasting, combining a 4 hr forecast chart with the statistical procedure. A trial with 850 mb charts for Central urope was successful. KLETTER shows that NAMIAS' method is only applicable when the end is towards normal. He designed an extended trend formula giving forecasts 36 hrs irther ahead. *Subject Heading:* **1. Extended forecasting.**—*C.E.P.B.*

8.5–166 551.509.33:519.2

Van der Bijl, Willem, **Statistische Bemerkungen zu H. Müller-Annen: "Versuche von angfristvorhersagen mit einer Kontingenzmethode" nebst weiteren Betrachtungen über den rognostischen Wert von Kontingenztabellen.** [Statistical remarks on H. Müller-Annen: ttempts at long-range forecasts with a contingency method, and further remarks on the rognostic value of contingency tables.] *Annalen der Meteorologie*, 7(7/9):289–302, **1955/56.** ables, 5 refs., eqs. English summary p. 302. Answer by HANS MÜLLER-ANNEN, *ibid.*, . 303–309. 6 refs. **DWB, DLC**—VAN DER BIJL criticizes MÜLLER-ANNEN's statistical method f forecasting monthly values (*see* 6.11–156, Nov. 1955, *MAB*) on 16 points, mainly because t is based on insufficient data and because the contribution of each of the preceding months to he forecast month is almost independent of the interval between them, although it is generally ccepted that in western Europe the effect of preceding conditions decreases rapidly with the assage of time and is inappreciable after 60 days. MÜLLER-ANNEN replies in detail. He laims that his method is practicable and not laborious. If one waits too long for basis material, limate may have changed in the interim. *Subject Headings:* **1. Long range forecasting . Statistical forecasting. I. Müller-Annen, Hans.**—*C.E.P.B.*

8.5–167 551.509.54:001.4

Dickey, Woodrow W. (*W. B. Airport Station, Denver*), **The use of strictly defined terms n summertime forecasts.** *Monthly Weather Review*, Wash., D. C., 84(5):179–188, May **956.** 14 figs., 14 tables. **DWB, DLC**—The desirability of using a fixed set of strictly defined erms to describe the areal distribution of summertime showers and thunderstorms in the laily State forecast is discussed, and the feasibility of doing so is investigated. The areal listribution of afternoon and evening showers in Colorado and the variations of the distribuions among various sections of the State are determined. The relative frequency of occurrence of forecast categories is determined for two sets of arbitrarily defined forecast terms. Significant differences are found, on the average, in the number of showers when various forecasting terms are used to describe their occurrence. A simple objective aid for forecasting the areal listribution of showers over the entire State of Colorado is presented to illustrate that there are meteorological variables that are related to the number of showers expected over an area which could form the basis for forecasts stated in strictly defined terms. *Subject Headings:* **1. Rainfall forecasting 2. Forecast terminology.**—*Author's abstract.*

## ARTIFICIAL PRECIPITATION

*See also:* **Nucleating ability of substances** (Pruppacher), 8.5–248; **Effectiveness of ice nuclei** (Pruppacher), 8.5–249; **De-activation of AgI as icing agent** (Picca), 8.5–252.

8.5–168 551.509.67

*Miller, W. McNab and Varineau, Verne J. (both, *Wyoming Agri. Exper. Sta.*), **Verification studies of commercial cloud seeding operations in Wyoming for the period May 1, 1951 through**

**Sept. 30, 1951.** *Wyoming. Agricultural Experiment Station, Mimeograph Circular*, No. 8 Nov. 1951. 19 p. fig., 8 tables. **DWB**—A study of precipitation records for 1921–195( for selected stations in target and control areas of Wyoming shows the magnitude of the year- to-year and place-to-place variations in departures from normal. Hence evaluation of the precipitation data obtained during 1951 seeding operations can only indicate that a possible effect of seeding ranging from −15.5% to +71.4% occurred. Month-by-month data for each year from 1921 to 1950 and for 1951 are presented for May, June, July, Aug. and Sept and for the 5 month average for NE, SE and NW seeding areas and for SW Wyoming contro areas and for interregional comparisons. *Subject Headings:* **1. Cloud seeding evaluation 2. Artificial precipitation 3. Precipitation data 4. Wyoming.**—*M.R.*

# STRUCTURE AND PHYSICS OF THE ATMOSPHERE

## COMPOSITION OF THE ATMOSPHERE

*See also:* **Participle size determination** (Cadle), 8.5–27; **Air pollution statistics** (Effenberger), 8.5–136; **Searchlighting atmos.** (Friedland, others), 8.5–142; **Chemistry of air and precip.** (Neuwirth), 8.5–247; **Positive and negative ion composition** (Johnson, Heppner), 8.5–333.

8.5–169 551.510:523.43

Goody, R. M., **The atmosphere of Mars.** *Weather*, 12(1):3–15, Jan. **1957.** 2 figs. 2 plates, 18 refs. Also: **The canal controversy.** *Ibid.*, p. 15. **DWB**—This general article usefully summarizes recent work. The albedo of Mars is 0.148 (earth 0.39), equilibrium temperature 217°K (245°K), general level of atmospheric temperature 30°K lower than earth. The year is nearly twice as long but the seasonal cycle is similar. The surface resembles a desert, with darker greenish areas. The seasonal polar caps are due to a few cm of ice-frost forming in spring from winter ice-mist. The albedo of clouds is 0.4, possibly due to a cold form of ice (210°K). The "violet layer" is possibly dust haze, yellow clouds are dust, blue and white clouds—ice. Surface isotherms at local noon, northern winter, are plotted. Winds at 10 km are 30–110 km/hr. Atmosphere is 0.2–0.25 as massive as earth's, ground pressure about 85 mb. It is mainly nitrogen; there is little oxygen and water vapor, but about 15 times as much $CO_2$ as earth's. Vertical structure is shown compared with earth, but the position of the tropopause is uncertain. The short article on "The canal controversy" concludes that there are no canals but there are signs of primitive plant life. *Subject Headings:* **1. Atmospheric structure 2. Planetary atmospheres 3. Mars.**—*C.E.P.B.*

8.5–170 545.8:551.510.41:546.793

Behounek, F. and Majerová, M., **Radon content of the air.** *Nature*, London, 178(4548) 1457, Dec. 29, **1956.** table, 6 refs. **DWB**—Values of atmospheric radon deduced from deposits on filter paper are only a small fraction of true content. Experiments in a closed room showed that there is no constant ratio. *Subject Headings:* **1. Radio activity of the atmosphere 2. Radon measurement.**—*C.E.P.B.*

8.5–171 551.510.4/5

†Nicolet, M. (*Royal Met. Inst., Brussels*), **Dynamic effect in the high atmosphere.** (In Kuiper, Gerard P., ed., **The earth as a planet.** Chic., Univ. of Chic. Press, **1954.** p. 644–712. 13 figs., bibliog. p. 707–712, 130 eqs.) **DLC**—The chemistry and physics of the upper atmosphere are considered from the point of view of diffusion, absorption of radiation, and thermal or radiative equilibriums of $O_3$, $O_2$, $N_2$, $NO_2$, $N_2O$, and OH; and atmospheric movements (winds) as deduced from photography or spectroscopy of the aurora, meteors, airglow, and noctilucent clouds; ionospheric tides and winds; meteors and radio astronomy. *Subject Headings:* **1. Upper atmosphere physics 2. Upper atmosphere structure 3. Diffusion in upper atmosphere 4. Upper atmosphere composition.**—*M.R.*

## ATMOSPHERIC POLLUTION

*See also:* **Radioactive waste disposal** (Wolman), 8.5–128; **Sky brightness and dust content in atmos.** (Casertano), 8.5–214.

8.5–172 551.551:551.510.42:628.53

Saissac, J., **Application des théories de la diffusion turbulente au problème de la pollution tmosphérique.** [Application of turbulent diffusion theories to the atmospheric pollution roblem.] *La Météorologie*, Paris, No. 38:151–160, April/June **1955.** 7 figs., 7 refs., 15 eqs. English and Spanish summaries p. 151. **DWB**—The general problem of atmospheric pollution eing, under certain conditions, closely linked to that of turbulent diffusion, the author (refer- ing principally to the work of Roberts and Sutton and the results obtained in the observation f smoke puffs) presents a mathematical method (based on meteorological parameters) for reating the most frequent case of pollution, that of the industrial smoke stack. *Subject Headings:* **1. Turbulent diffusion theories 2. Stack meteorology 3. Atmospheric pollution.** —*Author's abstract.*

## UPPER ATMOSPHERE—IONOSPHERE

*See also:* **Upper atmos. research** (Kaplan et al.), 8.5–22; **Symposium—ionospheric drifts,** 8.5–64; **Searchlighting atmos.** (Friedland, others), 8.5–142; **Meteoric influences on $E_s$ layer** (Neužil), 8.5–321; **Tropospheric radio propagation** (Tidd), 8.5–342; **Waves reflected from surface of ionosphere** (Uyeda, others), 8.5–343.

8.5–173 551.510.528:551.557

Jordán, Plácido (*Compañía de Aeropuertos Internacionales S. A. Int. Airport, Havana*), **Possible relationship between tropopause height and stratospheric easterlies in the tropics.** *merican Meteorological Society, Bulletin*, 37(1):36 37, Jan. **1956.** fig., ref. **DWB, DLC**— he author presents data from José A. Colón **"On the wind structure above the tropopause ver Puerto Rico"** (*see* 2.11–118, Nov. 1951, *MAB*) showing that for "every relative maximum f the tropopause height the maximum wind speed is a relative minimum and conversely," nd that "the absolute minimum of the tropopause height corresponds exactly to the absolute inimum of the wind speed which occurred in July." *Subject Headings:* **1. Tropopause-wind elationships 2. Tropopause height 3. Tropics.**—*I.L.D.*

8.5–174 551.547:551.510.528 551.524.7:551.510.528

Moore, J. G., **Average pressure and temperature of the tropopause.** *Meteorological Magazine*, London, 85(1014):362–368, Dec. **1956.** 4 figs., table, 3 refs. **DWB.** Also issued s *Great Britain. Meteorological Research Committee, M.R. Papers*, No. 874, Aug. 27, **1954.** *See* 6.6–234, June 1955, *MAB.*)—World charts show average pressure at tropopause in Jan. nd July, and areas where 2 tropopauses are present more than 10% of the time. Pressure nd temperature of the polar tropopause in Jan. and July are shown in circum-N-polar maps. he average temperature of the polar tropopause in 40°N was: Jan. 215°, July 217°; that of he tropical tropopause in 40°N: 214°, 210°; 20°N, 194°, 199°; 0°, 189°, 197°. Variation hrough the year is discussed. *Subject Headings:* **1. Tropopause pressures 2. Tropopause emperatures.**—*C.E.P.B.*

8.5–175 551.510.535:621.396.11

Allcock, G. McK., **The prediction of maximum usable frequencies for radiocommunication ver a transequatorial path.** *Institution of Electrical Engineers, London, Proceedings, Pt. B*, 03(10):547–552, July **1956.** 3 figs., table, 12 refs. **DLC**—Observations of transmission on 5 Mc/s from Hawaii received in New Zealand (great circle path 7500 km) in 1950–54 were ompared with British, American and Australian methods of predicting m.u.f. and with calcula- ions directly from h'f data in the S. Pacific. The predictions were 4–7 Mc/s too high. Predic- ions assuming 3 equal length hops were generally too low by 1–2 Mc/s, the discrepancy being ttributed to the presence of a sporadic-E region. *Subject Headings:* **1. Radiocommunication . Maximum usable frequency prediction.**—*C.E.P.B.*

8.5–176 551.510.535:621.396.6

Cole, A. W., **V.H.F. communication by ionospheric scatter.** *Electronic Engineering*, London, 28(340):230–235, June **1956.** 6 figs., table, 12 refs. **DLC**—Scattering by random variations in the E layer is effective below 30 Mc/s for distances up to 1400 mi, and is suitable for telegraphic traffic. The technical problems of transmission and reception are discussed. *Subject Headings:* **1. Ionospheric scattering 2. Ultrashort wave propagation.**—*C.E.P.B.*

8.5–177 551.510.535:621.396.812.3

Crow, D. A.; Kitchen, F. A.; Isted, G. A. and Millington, G., **A disturbing factor in very high frequency communications via ionospheric forward scatter.** *Nature*, London, 178(4545): 1280–1283, Dec. 8, **1956.** 10 figs., 5 refs. **DWB**—Difficulties in radio communication between Gibraltar and the United Kingdom, their causes and attempts to overcome them are discussed. *Subject Heading:* **1. Radio disturbances.**—*C.E.P.B.*

8.5–178 551.510.535

Davies, Frank T. (*Telecommunications Estab., Defence Res. Bd. of Canada*), **The ionosphere over northern Canada.** *Arctic*, Montreal, 7(3/4):188–190, **1954. DLC**—Ionospheric research carried out in Canada by the Telecommunication Div. of the Dept. of Transport in cooperation with the Radio Physics Lab. of the Defence Research Board is reviewed. The extent of ionospheric stations established, the results of studies on prediction of average height and electrical density of the ionosphere for given times of day and season, the radio noise level of northern Canada and contemplated ionospheric research are discussed. *Subject Headings:* **1. Ionospheric research 2. Ionospheric electron density 3. Canada.**—*I.L.D.*

8.5–179 551.510.535:551.594.7

Drummond, J. E., **The connection between ionospheric patterns and field strengths reflected on the ground.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):282–294, Nov. **1956.** 3 figs., table, 8 refs., eqs. **DWB**—If the ionosphere is regarded as a plane, patchy reflector, it can be shown by using Doppler shift theory and wave theory that drift and turbulent processes with periods less than $\lambda/2 \sin \alpha$($\lambda$ is the radio wavelength and $2\alpha$ is the angle subtended by the reflecting area on the ground) do not produce patterns on the ground and other short-length processes are attenuated. The correlogram of the reflected signal is also correspondingly modified, and some ionospheric observations are examined in the light of this theory. *Subject Heading:* **1. Ionospheric reflection coefficients.**—*Author's abstract.*

8.5–180 551.510.535

Dungey, J. W., **Convective diffusion in the equatorial *F* region.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):304–310, Nov. **1956.** 2 figs., 4 refs., 16 eqs. **DWB**—This paper discusses the convective diffusion which JOHNSON and HULBURT showed could take place across the geomagnetic field in the *F* region near the equator. It is shown that the convective diffusion will increase any irregularities which may be present. The usual formula for the conductivity is found to be inappropriate when diffusion is involved. The convective motion is regarded as that of a gravity-driven dynamo and its speed is controlled by the current flowing along the lines of force into lower levels of the ionosphere. The speed is found to be inversely proportional to the east-west scale of the irregularities, and for a scale of 100 metres may be a few meters/sec. *Subject Heading:* **1. Ionospheric diffusion.**—*Author's abstract.*

8.5–181 551.510.535

Eyfrig, R.; Harnischmacher, E. and Rawer, K., **Das weltweite Verhalten der Höhe der F2-Schicht.** [The world wide characteristics of the height of the F2 layer.] *Geofisica Pura e Applicata*, Milan, 33:153–162, **1956.** 4 figs., 2 tables, 13 refs. English and French summaries p. 153. **DLC**—Maps of the factor (M 3000) F2 which is a parameter corresponding to the inverse of the altitude of the F2-layer have been prepared for America between the magnetic equator and high magnetic latitudes. Common features of all maps are a daily minimum on the magnetic equator, a sunrise-maximum and daily maximum at a geographic latitude of about 40°N. This latter is less pronounced in summer than in winter. With increasing

olar activity we find a general decrease of M-values the equator daily minimum becoming elatively deeper. *Subject Headings:* **1. Ionospheric heights 2. F2 layer.**—*Authors' abstract.*

8.5–182 551.510.535:551.590.25:621.396.11

Naismith, R., **Oblique transmission by the meteoric E-layer.** *Wireless Engineer*, London, 33(7):159–162, July **1956.** 2 figs., table, 4 refs. **DLC**—British radar stations on 22.7, 25 nd 27 Mc/s were received in Norway (distance 900–1900 km) on 10–30% of the time, but ot at 600–700 and >3000 km. Conditions and turbulence in the meteoric E-layer are liscussed, including solar eclipse effects. Observations at Aberdeen and Weymouth (1000 km part) showed no systematic differences; this and other evidence suggests that abnormal eception is due to sporadic meteors rather than to turbulence. *Subject Headings:* **1. Radar ropagation 2. Meteoric E layer.**—*C.E.P.B.*

8.5–183 551.590.24:551.510.535

Saha, A. K., Ray, S., Data, S., et al., **Ionospheric observations during the solar eclipse of une 20, 1955.** *Science and Culture*, Calcutta, 21(8):475–477, Feb. **1956.** 4 figs., 2 refs. **)LC**—Ionospheric records made at the Ionosphere Field Station at Haringhata (22.9°N, 8.5°E, Geomagnetic latitude 12.5°N, 28 miles NE of Calcutta) where the eclipse of June 20, 955 was 0.67 total and the duration 2½ hours, are discussed with respect to E, Sporadic E, $F_1$ and $F_2$ layer variations. E region ionization dropped to 35% of average of control days 1 month on either side of eclipse), about 30 minutes before eclipse maximum. Maximum lrop could not be recorded because of $E_s$ ionization. No change in $fE_s$ values could be letected. $F_1$ layer showed a drop to 20% of control day, 8 minutes after maximum observation t ground. $F_2$ ionization was higher than average before eclipse, started to drop 1½ hours efore eclipse, dropped by *ca.* 31% 20 minutes after eclipse, maximum at ground, and took 3½ hours to recover. Theory involves solar particles 1500–2000 km/sec. *Subject Headings:* **. Eclipse effects on ionosphere 2. Solar eclipse, June, 1955 3. Haringhata, India.**—*M.R.*

8.5–184 551.510.535:523.73(54)

Thiruvengadathan, A. (*Solar Physics Obs., Kodaikanal*), **Solar tides in the F2 region over Kodaikanal.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(2):205–206, April **1956.** refs., table. **DWB, DLC**—Harmonic analysis of h'F2 and *fo*F2 records at Kodaikanal (10°14'N, 77°28'E) from June 13–27, 1955, at intervals of 30 min shows that semi-diurnal component was about 15% larger than diurnal component, and that amplitude and phase of semidiurnal component changed little during the period, but the variabilities of the amplitude and phase of the diurnal component were very large. Amplitude of semidiurnal variation was larger than for mid-latitude stations and nearly the same as Huancayo (50 km). *fo*F2 variations do not show tidal effects so well, since diurnal ionizing by solar radiation masks semidiurnal tides. *Subject Headings:* **1. Semi-diurnal F2 tides 2. Diurnal F2 tides 3. Kodaikanal, India.**—*M.R.*

8.5–185 551.510.535:621.396

Whale, H. A., **Effective tilts of the ionosphere at places about 1000 km apart.** *Physical Society of London, Proceedings, Ser. B*, 69(3):301–310, 1 March **1956.** 8 figs., 5 refs., eqs. **DWB**—Observations of bearing and elevation of signals received at Auckland, N. Z., from Fiji (9315 Kc/s, distance 2000 km) and Brisbane (9660 Kc/s, 2250 km) "are sometimes consistent with the existence during the daytime of effective ionospheric tilts which are similar at places more than 1000 km apart. These tilts are of the order of half a degree and are in opposite directions during the morning and the afternoon. They may correspond to actual tilts of a uniform ionosphere or be due to horizontal gradients of electron density." *Subject Heading:* **1. Ionospheric tilt.**—*From author's abstract.*

8.5–186 551.510.535:621.396.8

Whitehead, J. D., **The absorption of radio waves in an ionospheric layer.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):276–281, Nov. **1956.** 2 figs., 2 refs., 7 eqs. **DWB**—Formulas are given for the absorption per unit length of waves absorbed or reflected in the E or F region. The absorption of a 2 Mc/s wave reflected in a CHAPMAN layer of critical

frequency 3 Mc/s with and without taking account of the geomagnetic field shows that with the field a considerable amount of the total absorption occurs near the top of the wave trajectory in the deviating region. *Subject Heading:* **1. Ionospheric absorption.**—*C.E.P.B.*

8.5–187 551.510.535:551.594.7

Whitehead, J. D., **The focusing of short radio waves reflected from the ionosphere.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):269–275, Nov. **1956.** 3 figs., table, 5 refs., 6 eqs. **DWB**—Increases of amplitude for about 2 min of a 4.2 Mc/s wave vertically reflected from *F* layer ("bursts") are shown by simultaneous observations at Cambridge (Eng.) and Swaffham, 15 km to E, to result from focusing by large scale distortions moving horizontally overhead (MUNRO's travelling disturbances). The average velocity was 98 m/s. There were very few bursts at night, a rapid increase at sunrise, more in the morning than afternoon, and a gradual tailing off at sunset. *Subject Headings:* **1. Radio wave bursts 2. Ionospheric radio wave focusing.**—*C.E.P.B.*

## MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

*See also:* **Radiative balance in atmos.** (Massey et al.), 8.5–3; **Structure of turbulent shear flow** (Townsend), 8.5–10; **Atlas of thermal balance** (Budyko), 8.5–19; **Thermal balance of earth's surface** (Budyko), 8.5–20; **Heavy rainfall, Kyushu District** (Nagayama), 8.5–269.

8.5–188 551.511:532.5:608.4

Davies, T. V., **The forced flow due to heating of a rotating liquid.** *Royal Society of London, Philosophical Transactions, Ser. A*, 249(958):27–64, 22 March **1956.** 3 figs., 8 refs., 228 eqs. **DLC, DWB**—The "Rossby (wave or high-rotation) regime" in rotating liquid, of interest in meteorology, sets in at a critical angular velocity, the number of wave petals increasing with increasing angular velocity. This is a complex problem of stability which is investigated mathematically. The barotropic solution is inadequate and is modified to take account of progressive waves. Agreement between theoretical and experimental results is good for small values of $m$, the wave number, but diverges considerably for $m>3$. The baroclinic theory explains the main trend of the stability phenomena. It is shown that there is a relation between mean vertical and horizontal temperature gradients and angular velocity. The theory "throws some light on changes which occur in the long-wave patterns of the upper part of the troposphere." *Subject Headings:* **1. Fluid dynamics 2. Waves in the westerlies 3. Rossby regime.**—*C.E.P.B.*

8.5–189 551.511:681.1

Hess, Seymour L., **A simple analog computer for determination of the LaPlacian of a mapped quantity.** Florida. State Univ. Dept. of Meteorology. Contract Nonr-1600(00), Project NR-082-071, Technical Report, No. 7, May 1, **1956.** 18 p. 7 figs. (incl. photo), ref., 6 eqs. **DWB**—The determination of the LaPlacian of a mapped quantity, such as the geostrophic vorticity, is an important but a time consuming process. The common procedure involves a number of interpolations and an algebraic computation for each point at which the evaluation is made. A device is presented in which the slow process of interpolation is replaced by the faster and more reliable process of measurement of distance between isopleths of the mapped quantity, and the algebraic calculation is replaced by the rapid, automatic operation of a DC analog computer. The numerical result is presented as the deflection of a millivoltmeter. In practice the use of this computer proved to be a rapid, reproducible, sufficiently accurate means of determining the geostrophic vorticity from an analysis of the contours of an isobaric surface. *Subject Headings:* **1. Vorticity computations 2. Computing machines.**—*Author's abstract.*

8.5–190 551.511

Mintz, Yale, **The total energy budget of the atmosphere.** (In: California. Univ. at L. A. Dept. of Meteorology, Contract AF 19(122)-48, General Circulation Project, Final Report, March 15, **1955,** Article 13. 6 p. 2 figs., table, 4 refs., 8 eqs. **DWB**—The energy balance equation for a polar cap is analyzed and the total poleward energy flux is computed for winter

nd summer from the geostrophic eddy flux of sensible heat (maximum 45–50°N), the potential eat flux, caused by deviations from the adiabatic state, the geostrophic eddy and the mean lux of kinetic energy. The total flux seems not to be directed equatorwards south of 60°N s it was computed by BAUR and PHILIPPS. Electronic equipment was used to make the umerous computations. *Subject Headings:* **1. Energy budget 2. General circulation 3. Circulation statistics.**—*A.A.*

8.5–191 551.511

Mun, Kim Zin, **O vlazhno-adiabaticheskikh protsessakh i ekvivalentno-udel'noĭ teploemkosti.** [Moist-adiabatic processes and equivalent-specific heat.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:351–357, July/Aug. **1955. DLC**—A study of the moist-adiabatic processes in the actual atmosphere with the aid of the concept of equivalent-specific heat capacity of a mixture (air+water vapor). By means of this concept the author studies the vertical temperature gradient of moist air and concrete instances of adiabatic mixing of air. *Subject Headings:* **1. Adiabatic processes 2. Vertical temperature gradient.**—*Trans. of author's abstract.*

8.5–192 551.511.2:532.5:551.509.312

Palm, Enok, **On the stability of linear flow.** *Norske Videnskaps-Akademie i Oslo. Institutt for Vaer- og Klimaforskning, Report*, No. 2, **1955.** 6 p. fig., 6 refs., 17 eqs. **DWB**—The Green's transform of the equation of motion for 2-dimensional perturbation of linear flow is applied to obtain some properties of exponential unstable eigensolutions. Application would be to numerical prediction. *Subject Headings:* **1. Two-dimensional fluid flow 2. Stability of waves 3. Green's function 4. Numerical forecasting.**—*From author's abstract.*

8.5–193 551.511.33

Quintela, R. M., **Trabajos recientes sobre termodinámica de la atmósfera.** [Recent works on thermodynamics of the atmosphere.] *Meteoros*, Buenos Aires, 5(3):210–211, July/Sept. **1955. DWB, DPU**—A discussion of studies on atmospheric thermodynamics published in Latin countries during the past decade. The author mentions the contributions of VAN MIEGHEM, DUFOUR, DEFAY, DE DONDER, E. A. QUINTEROS, G. DEDEBANT, etc. *Subject Heading:* **1. Thermodynamics of the atmosphere.**—*I.L.D.*

8.5–194 551.551:551.511:533.7

Wippermann, F. (*Deutscher Wetterdienst, Frankfurt/M.*), **Numerical investigations of temporal change of spectral distribution of kinetic energy in a twodimensional non-divergent and frictionless current.** Germany. Deutscher Wetterdienst, Contract AF 61(514)-735-C, Technical Note No. 3, [**1956?**]. 20 p. 9 figs., table, 7 refs., 12 eqs.—Stepwise integration of the vorticity equation for barotropic flow permits the computation of spectral distribution of kinetic energy for specific points of time. Investigated is the question of a special quasi-stationary spectral distribution; hereby occurs, after some 4 days for several arbitrary selected initial spectral distributions the shape of a double maximum as observed in the atmosphere. From the energy tendency computations, averaged over all wave lengths and represented as function of time, it can also be concluded that the spectral distribution observed in the atmosphere corresponds to a quasistationary one. The occurrence of oscillations in the transfer of energy between basic current and the oscillations is established. The period of such oscillations is approximately 3½–4 days in middle latitudes and mainly depends on the angular velocity of the earth. The state of balance of horizontal currents with respect to the existence of such oscillations is considered. The advantages and disadvantages of the integration process by means of Fourier's coefficients are discussed. *Subject Headings:* **1. Turbulence spectrum 2. Kinetic energy in atmosphere.**—*Author's abstract.*

## GENERAL CIRCULATION

*See also:* **Atmos. electricity and jet streams** (Schaefer), 8.5–331.

8.5–195 551.513.1:551.55

Flohn, H., **Tropical circulation patterns.** *World Meteorological Organization, [Publications]*, No. 38, TP. 13; *Technical Note*, No. 9, **1955.** 12 p. 2 figs., 4 tables, 26 refs. French,

Russian and Spanish summaries, preceding p. 1. **DWB**—The trade wind circulation is dis cussed from a classical and a modern dynamic climatology approach, as are tropical monsoons equatorial westerlies, general aspects of tropical circulation and anomalies of the equatoria circulation. Two models are compared: 1) the Hadley-Ferrel model and 2) the author's ne model based on upper air data obtained during the past decade in the tropics. The newe model lowers the cores of easterlies from 6 to about 4 km and allows for westerlies at 8–11 km Furthermore the NE and SE trades are secondary circulations at bottom of the larger easterl core. Tropical monsoons are not considered as resulting from continental-oceanic dust fror planetary circulation changes. *Subject Headings:* **1. Tropical circulation patterns 2. Trad wind theory.**—*M.R.*

8.5–196 551.513.1:551.543.

Huber-Pock, Franz, **Untersuchungen über den Anteil bestimmter Atmosphärenschichte am Zustandekommen von Bodendruckänderungen.** [Research on the contribution o different atmospheric layers in bringing about surface pressure changes.] *Archiv für Meteoro logie, Geophysik und Bioklimatologie, Ser. A*, 9(4):471–486, **1957.** 6 figs., 7 refs., 5 eqs. Ger man, English and French summaries p. 471–472. **DWB**—To study the contribution o different layers to surface pressure changes, HOLLMANN's "reciprocal vorticity equation" wa derived. Oct. 1–2, 1950 is used as a numerical example. The local change and advectio of absolute reciprocal vorticity show the effect of different layers. The method meets witl great difficulties however, and the results are confirmed by calculation of vertical velocity at different levels from potential temperatures. It is found that the higher layers of th troposphere contribute most to the variations of surface pressure. *Subject Heading:* **1. Pressur change analysis.**—*C.E.P.B.*

8.5–197 551.513.2:551.515:551.577.32(52

Kamiko, T., **Seasonal changes of long waves and belts of maximum westerlies in the Fa East.** *Journal of Meteorological Research*, Tokyo, 8(2):69–76, March **1956.** 15 figs., 6 refs In Japanese; English summary p. 69. **DWB, DLC**—Characteristics of the seasonal changes o long waves and belts of maximum westerlies in middle latitudes in the Far East are studied b using the 5-day mean 700-mb charts. In connection with the trend of zonal index the followin subjects are discussed: seasonal changes of the position and strength of long-wave troughs an propagation velocity of mean trough: seasonal displacement of maximum westerly belts t south or northward; and the last stage of the bai-u season in relation to index cycles and "breal down." *Subject Headings;* **1. Waves in the westerlies 2. Zonal index 3. Bai-u 4. Fa East.**—*From author's abstract.*

8.5–198 551.513.2

Starrett, Loyd G., **On easterly waves in the Pacific.** *U. S. Typhoon Post Analysis Board Guam, Fifth Annual Report*, p. 27–33, **1952.** Photostat of typescript. **DWB**—Easterly wave are described as they appear in the Pacific within the approximate limits 5°N to 15°N, 130°E to 180°E. The description is based on observation and experience in postanalysis, using very limited data. Each of the common meteorological variables is discussed briefly in its relatio to easterly waves. The Easterly Wave Program of the 2143d Air Weather Wing is describe in general terms and its primary purpose presented. *Subject Headings:* **1. Easterly wave 2. Pacific Ocean.**—*Author's abstract.*

8.5–199 551.513.7:551.506(73

Klein, William H. (*Extended Forecast Section, U. S. W. B., Wash., D. C.*), **Weather and circulation of 1955.** *Weatherwise*, Boston, 9(1):5–10, Feb. **1956.** 4+ figs. **DWB**—Positive height anomalies at 700 mb of 200 ft in Mid-Pacific and 180 ft in Davis Strait for year 195 were associated with stronger than normal westerlies over N.E Pacific (high index), blocking action over the Continent and weaker than normal westerlies over the N. Atlantic (low index) Monthly maps also showed similar anomalies. The jet stream in the Pacific and Atlantic seasonal circulation charts for the Northern Hemisphere and seasonal weather (temperature and precipitation) maps for the U. S. are presented and discussed. Precipitation was above normal over most of the U. S. in spring, summer, and autumn, but below normal in winter

(1954–5). *Subject Headings:* **1. Atmospheric circulation anomalies 2. Weather anomalies 3. U.S.A.**—*M.R.*

## ATMOSPHERIC DISTURBANCES

*See also:* **Tornado damage studies** (Glaser et al.), 8.5–18; **Evaluation of 700 mb data** (Small), 8.5–116; **Weather changes and accidents** (Horváth), 8.5–118; **Cyclogenesis study** (Clarke), 8.5–163; **Long waves and belts of max. westerlies** (Kamiko), 8.5–197; **Tropical thunderstorm** (Portig), 8.5–224; **Gust, N Kanto** (Akita), 8.5–232; **Dust and thunderstorm, Ahmedabad** (Upadhyaya), 8.5–235.

8.5–200 551.515(264)

Rai Sircar, N. C. (*Met. Office, Poona*), **A climatological study of storms and depressions in the Bay of Bengal.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(2):157–160, April **1956.** 3 figs., 7 refs. **DWB, DLC**—A summary of a forthcoming Memoir of the Indian Meteorological Dept., giving essential facts deduced from a statistical study of 793 disturbances, 288 of which were classed as cyclones (force 8 or higher), occurring during a 61 year period (1890–1950) in the Bay of Bengal. Frequency of disturbances, crossing each 1° latitudinal-longitudinal square, and frequency originating and dissipating in 2° squares are shown on charts. Greatest frequency is in post monsoon period. No season (July-Nov.) has been without a disturbance in the 61 years. Oct. and Nov. are most favorable months for cyclones. In winter, only the S portion is affected. In Aug., only the NW portion is affected. In pre-monsoon and post-monsoon months the affected area spreads. Speed and movement, risk factors, regional and dissipation factors are included in the study. *Subject Headings:* **1. Bay of Bengal cyclones 2. Cyclone statistics 3. Bay of Bengal.**—*M.R.*

8.5–201 551.515.13(261)

Markgraf, Hans and Macht, Hans G., **Zyklogenetische Gebiete auf dem nordatlantischen Ozean.** [Cyclogenetic regions of the North Atlantic Ocean.] *Annalen der Meteorologie*, 7(7/9):310–321, **1955/56.** 22 figs., tables, 5 refs. **DWB, DLC**—It has long been accepted that new cyclones tend to form near Cape Hatteras. Author prepared for Jan. and July charts of pressure falls (8×falls of 15 mb+4×falls of 10 mb) and found that deepening is most frequent near Iceland, but this is because depressions are most frequent there. He calculates from "Historical Weather Maps" number of deepenings of closed systems per 5° square (smoothed over 9) relative to number of depressions in Jan. and July. The ratios are very irregular but there is a maximum near Cape Hatteras. A number of generalized tracks from the American coast are plotted and velocity tabulated. The mode is 60–70 km/hr in Jan. and 20–30 km/hr in July. The greater the pressure fall, the higher the speed. *Subject Headings:* **1. Cyclone frequencies 2. Cyclone tracks 3. North Atlantic.**—*C.E.P.B.*

8.5–202 551.515.2(548)

Bhaskara Rao, N. S. and Ramakrishnan, K. P. (both, *Regional Met. Centre, Madras*), **Some features of the Kakinda storm, May 1955.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 6(4):367–370, Oct. **1955.** 4 figs., 2 tables. **DWB, DLC**—The synoptic situations associated with the storm are described with the aid of tables showing the surface and upper winds at Vesakhapatham, Masulipatam and Kakinda, graphs showing pressure variations at Kakinda during May 1–7 and rainfall in the four days May 5–8, a map giving the track of the storm and tables of rainfall in the vicinity of the track of the storm. *Subject Headings:* **1. Tropical cyclones 2. India 3. Bay of Bengal.**—*I.L.D.*

8.5–203 551.515.2:551.577

Mook, Conrad P. (*U. S. W. B., Nat. Airport, Wash., D. C.*), **Surface streamlines associated with the torrential rains of August 18–19, 1955, in the northeastern United States.** *Monthly Weather Review*, Wash., D. C., 83(8):181–183, Aug. **1955.** figs., 9 refs. **DWB**—C. E. PALMER's use of the streamline analysis technique of BJERKNES and collaborators "to locate, on day-to-day low-level weather maps in the tropics, lines of convergence" associated with convective cloud patterns, is applied to an analysis of the weather associated with the rain occurring in the wake of hurricane "Diane" in Aug. 1955. The method of analysis using

the construction of isogons is described and resulting surface streamline charts are reproduced. The streamline pattern was found to indicate "a marked zone of convergence which lay close to the subsequent path of the storm center and across the region of flood-producing rainfall." *Subject Headings:* **1. Streamline analysis 2. Convergence 3. Hurricane rainfall 4. Hurricane "Diane" (1955).**—*I.L.D.*

8.5–204 551.501.8:551.515.3(262.5)

Popov, N. I., **Smerchi na poberezh'e Chernogo moria.** [Tornadoes over the Black Sea coast.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:35–37, Sept./Oct. **1955.** 5 figs. **DWB, DLC**—The author describes in detail the radar observations on four tornadoes which occurred from July 22 to Sept. 29, 1954 on the Caucasian coast of the Black Sea. A diagram of the radarscope of the Sept. 29 tornado, photographs of the tornadoes and maps of their movement are presented. *Subject Headings:* **1. Tornado observations 2. Radar tornado photographs 3. Black Sea.**—*I.L.D.*

8.5–205 551.515.3(431)

Schwandt, H. and Müller, G., **Eine Windhose bei Magdeburg.** [A whirlwind near Magdeburg.] *Zeitschrift für Meteorologie*, 10(9):284, Sept. **1956.** fig. **DLC**—Six photographs of a spout on July 25, 1955, are reproduced. Development took 12 min and dissolution 6 min. *Subject Headings:* **1. Whirlwinds 2. Magdeburg, Germany.**—*C.E.P.B.*

8.5–206 551.515.4:523.746

Cehak, Konrad, **Über periodische und säkulare Schwankungen der Gewitterhäufigkeit auf der Erde.** [Periodic and secular variations of thunderstorm frequency on the earth.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(4):487–513, **1957.** 3 figs., 8 tables, 23 refs. German, English and French summaries p. 487–488. **DWB**—Thunderstorm days for 159 stations are arranged according to 11-year sunspot cycle. Maximum frequency occurred most often 1 year before to 2 years after spot max. Minima were less definite but tended to occur about spot min. Years with fewest thunderstorms in America had most thunderstorms in Europe. Statistical tests showed a real connection with sunspots at less than half the stations. Data for 12 stations in Europe and 3 in S. Africa were examined for a 26-day cycle, without definite result. Secular variation showed an increase at most U. S. stations but a decrease in parts of Europe. Previous work on sunspot cycles is compared. *Subject Headings:* **1. Thunderstorm variations 2. Sunspot cycles.**—*C.E.P.B.*

8.5–207 351.814:551.515.4 351.814:551.509.6

U. S. Laws. Statutes, etc., **Aeronautical statutes and related material: the Civil Aeronautics Act of 1938, as amended and other provisions relating to civil aeronautics. Revised June 1, 1954.** Compiled by the Staff of the Civil Aeronautics Board. **1954.** 354 p. **DWB**—A group of several dozen plans, laws or acts enacted by Congress or proposed by the President of the U. S., affecting Civil Aviation in the U. S., from 1872 to 1953, with amendments to date. These include (on p. 246) the act enabling the U. S. Weather Bureau to make a study of thunderstorms 62 Stat. 470 and (on p. 246-249) the act creating the Weather Modification Committee (Advisory Commission on Weather Control) 67 Stat. 559. *Subject Headings:* **1. Thunderstorm Project 2. Weather control. I. U. S. Civil Aeronautics Board.**—*M.R.*

8.5–208 551.555.6:551.515.8

O'Connor, J. F. and Fean, C. R. (both, *National Weather Analysis Center, U. S. W. B., Wash., D. C.*), **Record-breaking cold wave of mid-November 1955 in the Northwest.** *Monthly Weather Review*, Wash., D. C., 83(11):279-291, Nov. **1955.** 13 figs., table, 9 refs. **DWB, DLC**—The authors present a comprehensive synoptic analysis of the record breaking cold spell that "hit Montana on Nov. 11 and spread westward and southwestward through the Plateau persisting in severity for a week, Nov. 11–18, 1955. Dynamic instability associated with an unusual confluence in the westerlies normal to the coasts of Western Canada produced the retrogression which permitted a deep cold upper vortex to plunge southeastward from Alaska to Washington across more than 2000 feet of height in 48 hours." This readjustment in the large scale circulation would not be forecast by any current method. Record breaking surface

negative temperature anomalies were produced by the persistence of a dynamic cyclonic vortex over the northwestern states. Record breaking upper-tropospheric low temperatures maintained the deep cyclonic cold dome over this area as a result of a continued flux of kinetic energy from the developing ridge upstream. The strikingly warm core of stratospheric air at 300 mb appears to have been associated most closely with the cyclonic vorticity maxima. In the south and east quadrants of the cold dome, tropical air was completely absent from the circulation in the upper troposphere within about 600 miles of the center owing to the lowness of the tropopause. A secondary jet associated with the baroclinicity of the Arctic front appeared to be the most prominent aspect of the upper peripheral circulation. Soundings through the cold dome indicated sloping stratification of Arctic, continental polar and maritime polar air masses within the inner core, with tropical air aloft no closer than about 600 miles. *Subject Headings:* **1. Cold waves 2. Dynamic instability 3. Cold domes 4. Northwest United States.**—*I.L.D.*

8.5–209 551.515.83(261)

Douglas, C. K. M.; Saunders, W. E. and Hinkel, C. H., **Speed of warm fronts.** *Meteorological Magazine*, London, 85(1014):375–376, Dec. **1956. DWB**—Referring to Hinkel and Saunders, *Met. Mag.*, 84(998):241–244, Aug. 1955 (*see* 6.11–212, Nov. 1955, *MAB*), on the greater speed of warm fronts over sea than over land, Douglas discusses causes of the difference (surface friction *vs* thermal shear and surface heating). Saunders and Hinkel reply that the second factor was ruled out and a combination of friction and turbulence is the most likely cause. *Subject Headings:* **1. Warm fronts 2. North Atlantic.**—*C.E.P.B.*

## RADIATION AND TEMPERATURE

### RADIATION

*See also:* **Radiative balance in atmos.** (Massey), 8.5–3; **Radiant energy of the sun** (Kondrat'ev), 8.5–8; **Symposium-geomag. activity and solar-terrestrial relationships,** 8.5–62; **Solar energy,** 8.5–120; **Biological effects of atomic radiation** (Natl. Acad. Sci.), 8.5–125; **Determination of sun's altitude . . .** (Reidat), 8.5–140; **Radiative flux variation research** (Santomauro), 8.5–141; **De-activation of AgI as icing agent** (Picca), 8.5–252; **Radioactive sulphur in rain water** (Goel), 8.5–271.

8.5–210 551.521.2/3

Kondrat'ev, K. Ia. and Elovskikh, M. P., **Raspredelenie intensivnosti effektivnogo izlucheniia i protivoizlucheniia po nebosvodu.** [Distribution of intensity of effective radiation and counter-radiation in the sky.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:445–452, Sept./Oct. **1955.** 5 figs., table, 8 eqs. **DLC**—Approximate theoretical formulas are derived for calculating the relative intensity of the effective radiation of the earth's surface and of the counterradiation of the atmosphere for a clear sky and complete and partial cloudiness. In the absence of an inversion, the actual atmosphere can be considered quasi-isothermal in relation to the distribution of effective radiation and counterradiation of the sky. In case of an inversion, it is necessary to take into account a stratification correction. The results of experimental determinations of effective radiation and atmospheric counterradiation confirm the theoretical formulas. *Subject Headings:* **1. Effective radiation 2. Sky radiation.** —*Trans. of authors' abstract.*

8.5–211 551.521.1:551.521.61

Lönnqvist, Olov, **Theoretical verification of the logarithmic formula for the relative net radiation to a cloudless sky.** *Arkiv för Geofysik*, Stockholm, 2(8):151–159, **1954.** 3 figs., 9 refs., 21 eqs. **DLC**—The relative net radiation $r$, i.e., the ratio (in %) between the effective radiation and the blackbody radiation at the surface temperature, can be expressed by $r = A_1 - D \ln u$, where $u$—vertical optical depth of water vapor in mm, corrected for pressure dependence of absorption coefficient of water vapor; $A_1$—depends slightly on surface temperature, lapse rate and humidity conditions. Introducing a quasi-wave length $\eta$, which varies between 0 and 1 when the true wave length varies between 0 and $\infty$, the author could show

that the absorption coefficients of water vapor, plotted against $\eta$ give an exponential relation. Mathematical transformations with some approximations lead to the logarithmic formula. An equation of general applicability $r = 57 - 10\ ln\,[(U+0.014)/(1+0.0034U)]$ is found also from Callendar's empirical function for the transmissivity of the wave band. The constants should be changed, however, to fit observed values. *Subject Headings:* **1. Effective radiation 2. Infrared radiation.**—*A.A.*

8.5–212 551.521.14

Georgi, J., **Absorption der Sonnen- und Himmelsstrahlung an metallblanken und weissen Oberflächen.** [Absorption of sun and sky radiation on polished metal and white surfaces.] *Germany. Deutscher Wetterdienst. Instrumentenamt Hamburg, Technische Mitteilungen des Instrumentenwesens des Deutschen Wetterdienstes, New Ser.*, No. 2:14–20, **1956.** fig., table, 5 refs., eqs. **DWB**—A method of measuring reflection of the various components of solar radiation from nickel, chrome and magnesium oxide is described, and the measured values are tabulated. 36% of the total radiation is absorbed by nickel, 44% by chrome and 8% by magnesium oxide. The absorption is stronger for shorter wave lengths in the case of the metals and for longer wave lengths in the case of magnesium oxide. *Subject Heading:* **1. Albedo of metal surfaces.**—*G.T.*

8.5–213 551.521.14:69

Hutchinson, F. W. and Cotter, M. O., **Solar irradiation of southeast or southwest inclines.** *Heating, Piping and Air Conditioning*, Chicago, 27(10):114–116, Oct. **1955.** fig., tables 9b and 10b. **DWB**—Last of the current series of three data sheets covering the hourly and monthly irradiation of inclined surfaces. Data tables for each hour for each month for southeast and southwest walls with 30° or 60° backward slope or for horizontal surfaces at latitudes 30°, 35°, 40° or 45°N. Derivation and interpretation of data is outlined in theory and practice. *Subject Headings:* **1. Solar irradiation 2. Radiation on oriented slopes.**—*M.R.*

8.5–214 551.521.31:535.33:551.510.42

Casertano, Lorenzo, **Sulla luminosità del cielo e sul contenuto di polveri nell'atmosfera.** [On sky brightness and dust content in the atmosphere.] *Geofisica Pura e Applicata*, Milan, 33:177–186, **1956.** 5 figs., 2 tables, 19 refs. English and Italian summaries, p. 177. **DLC**—Experimental outlines of sky brightness in the red and blue fields of spectrum are analyzed. From comparison with theoretical predictions one assumes the explanation about the different behavior of brightness in the two considered fields and possibility—under certain conditions—of taking account of primary scattering only. Considering also non-molecular scattering a method is shown for deducing, from the measurements of intensities of sky radiation, the value of parameter representing the content of dust in the atmosphere. Some experimental values found in measurements made at the "Osservatorio Vesuviano" are discussed. *Subject Headings:* **1. Sky brightness 2. Sky light spectroscopy studies 3. Dust content of air.**—*Author's abstract.*

8.5–215 551.521.63(261.3)

†Matzke, H. and Schmidt, K. H., **Beitrag zum UV-Strahlungsklima der südlichen Ostseeküste.** [Contribution to the UV radiation climate of the southern Baltic coast.] *Zeitschrift für Meteorologie*, 10(8):225–238, Aug. **1956.** 11 figs., 2 tables, 50 refs. **DLC**—Continuous photographic measurements of long-wave UV radiation (UV-A) from sun and sky on a horizontal surface at Warnemünde (54°11′N, 12°5′E), May 1950 through April 1951, are analyzed. Apparatus and standardization are described, with sample records. Curves are given of monthly and 10-day means and daily sums of total, sky and sun radiation. The maximum was in May though June was the sunniest month. Monthly means are given for anticyclonic and 2 types of cyclonic weather. The ratio of UV radiation on days with a given fraction $S$ of that with 100% sunshine is expressed as $(0.46+0.54\,S)$; values are also calculated of total, sky and sun UV with different sun heights. Much literature is referred to. *Subject Headings:* **1. Ultraviolet variations 2. Warnemünde, Germany.**—*C.E.P.B.*

8.5–216 550.384:551.79:551.521.64:550.93

Elsasser, Walter; Ney, E. P. and Winckler, J. R., **Cosmic-ray intensity and geomagnetism.** *Nature*, London, 178(4544):1226–1227, Dec. 1, **1956.** 2 tables, 6 refs., 6 eqs. **DWB**—

Remanent magnetism of ancient bricks in France suggests that since AD 200 geomagnetic field intensity has dropped by 65%. If this decrease is general, cosmic ray flux and production of radio carbon must also have dropped. The bearing of this on geological age determination by $C_{14}$ is discussed. *Subject Headings:* **1. Paleomagnetic variations 2. Cosmic ray variations 3. Radio carbon dating.**—*C.E.P.B.*

## TEMPERATURE

*See also:* **Radiative balance in atmos.** (Massey et al.), 8.5–3; **Air-sea temp. difference and wave generation** (Fleagle), 8.5–89; **Wheat flowering and air temp.** (Mallik, Subramanian), 8.5–111; **Index of temp. climate** (Nishiuchi), 8.5–113; **Frost penetration problems** (Jumikis), 8.5–119; **Thermal anomalies** (Prokeev), 8.5–148; **Temp. correction** (Pauly), 8.5–157; **Mean tropopause pressure and temp.** (Moore), 8.5–174; **Eastern Snow Conference,** 8.5–272; **Statistical study of New England snowfall** (Galway), 8.5–276; **Effects of atmos. refraction on leveling deduced from vertical temp. gradient** (Kukkamäki), 8.5–326.

8.5–217 551.524(410)

Shellard, H. C., **Monthly averages of accumulated temperature above and below various base temperatures for stations in Great Britain and Northern Ireland, 1921–50.** *Great Britain. Meteorological Office. British Climatological Branch, Memoranda,* No. 5, **1956.** 12 p., 4 figs., 8 tables, 9 refs. Mimeo. **GB-MO**—After investigating the accuracy of various methods of calculating accumulated temperature, that of H. C. S. Thom (*Monthly Weather Review,* 82:111, 1954, *see* 6.4–205, April, 1955, *MAB*) is adopted and values calculated for 1921–50, below 70°, 60°, 50° and 42°F and above 42° and 60°F, are tabulated monthly for 49 stations. Maps show values below 60°F (actual and reduced to sea level). Curves are given for reading off accumulated temperature degree days from monthly mean temperature and standard deviation. *Subject Headings:* **1. Accumulated temperatures 2. British Isles.**—*C.E.P.B.*

8.5–218 551.524.35(546)

Bhalotra, Y. P. R. (*Met. Office, New Delhi*), **A spell of exceptionally low temperatures over Western Pakistan and Northwest India from May 6–12, 1955.** *Indian Journal of Meteorology and Geophysics,* Delhi, 7(2):204–205, April **1956.** table, fig. **DWB, DLC**—Chart and table show areas of W. Pakistan and the Northwest Frontier Provinces where maximum temperatures were 20° to 26°F below normal and minimum temperatures 10°–15° below normal in the second week of May, 1955. A cold wave (cool spell) in the third week of April, and this cool spell from 1–15 May, made the normally hot season more bearable. Rainfall amounts in various sections (1–2 in. total for May 1955) are given. Hail the size of ping-pong balls fell at Khadpur near Delhi on the evening of May 10, involving loss of life and much damage. *Subject Headings;* **1. Cold spells in Pakistan 2. Hailstone size 3. West Pakistan 4. Northwest India.**—*M.R.*

8.5–219 551.524.35

§Craddock, J. M. and Lowndes, C. A. S., **A synoptic study of anomalies of surface air temperature over the Atlantic half of the Northern Hemisphere.** *Great Britain. Meteorological Research Committee, M.R.P.,* 994, July 12, **1956.** 6 p. 11 figs., 3 refs. Mimeo. **DWB**—Differences of 5-day temperature means from normal (1921–40) were charted for 240 stations in U.S.A., North Atlantic and Europe for May 1955–April 1956. Some of the charts showed very large anomalies. Ten salient periods are selected for discussion and illustrated by representative 5-day charts. The patterns of temperature anomaly are large, slow moving and long-lived. They may be of use for long range forecasting either through their persistence or as indicators of the general atmospheric circulation. *Subject Heading:* **1. Temperature anomalies.**—*C.E.P.B.*

8.5–220 551.524.37:634(434)

Winter, Fritz, **Erfahrungen bei Messfahrten zur Beurteilung der Kaltluftgefahr.** [Experiences on journeys to investigate cause of cold air danger.] *Meteorologische Rundschau,* 9(11/12):219–221, Nov./Dec. **1956.** 10 refs. **DWB**—In connection with mapping suitability for fruit culture in Baden-Würthemberg, temperature measurements were made with an

automobile. Methods and apparatus are described. On level ground they were easily corrected with a thermograph, but in hilly ground on radiation nights slope winds caused considerable local differences, especially just before sunrise. Assessment of late frost risk is described. *Subject Headings:* **1. Frost danger charting 2. Fruit culture 3. Germany.**—*C.E.P.B.*

8.5–221 551.524.4:551.585

Lautensach, Hermann and Bögel, Robert, **Der Jahresgang des mittleren geographischen Höhengradienten der Lufttemperatur in den verschiedenen Klimagebieten der Erde.** [The annual variation of the mean geographical vertical gradients of air temperature in different climatic regions of the earth.] *Erdkunde*, 10(4):270–282, Nov. **1956.** 24 figs., 2 tables, 21 refs. English summary p. 270. **DWB**—On the basis of 297 pairs of stations (mountain and base) in all parts of the world, and some aerological data, the vertical temperature gradients below the peplopause are determined for each month, and the annual variations plotted. Nine types of vertical variation are found: A, Ground inversion; B, High fog type; C, Normal; D, convection type ($D_1$ without, $D_2$ with cumuliform cloud); E, squall weather type; $F_1$, thunder type; $F_2$, Rain weather type. The peculiarities of each type are listed and its distribution discussed. Climates are grouped into 9 types according to the annual variation of gradient type: Af, Aw, BW coastal, BW inland, Cs, Normal, Maritime variety of normal, Cold pole, Polar. A world map shows the distribution of 5 main types. As the monthly mean gradients range from +1.16 to −1.84°C/100 m, it is emphasized that the usual basis of temperature reduction to sea level (0.5°C/100 m) is not justified. *Subject Headings:* **1. Temperature profiles 2. Climatic types.**—*C.E.P.B.*

8.5–222 551.524.7

Moore, J. G., **The tropospheric temperature lapse rate.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(4):468–470, **1957.** table, 3 refs. English, German and French summaries p. 468. **DWB**—Mean lapse rate 700–300 mb is computed for latitudes 80°N to 50°S, Jan. and July. It shows no systematic variation with latitude and averages 6.4°C/km. *Subject Heading:* **1. Temperature lapse rate.**—*C.E.P.B.*

8.5–223 551.524.75:551.577

Steinhauser, Ferdinand, **Die Temperaturänderungen in der freien Atmosphäre bei Niederschlägen.** [Temperature changes in the free atmosphere during precipitation.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(4):446–467, **1957.** 7 tables, 2 refs. German, English and French summaries p. 446–447. **DWB**—Radiosonde ascents at Vienna, 04 and 16 h, were used to compute temperature changes at surface and pressure levels 850–200 mb when rain had fallen in the interval. In 4–16 h (day) in spring and summer rises were much more frequent than falls of temperature, but in fall and winter up to 500 mb falls were more frequent than rises. At night (16–4 h) falls of temperature were considerably more frequent than rises, especially in summer. Amount of precipitation makes no difference. Rains were then classified as cold front and warm front. Differences are found but not always those expected from the change of air mass. Days when cold front precipitation began showed a greater cooling by day than all days with precipitation. Finally, temperature changes at 850 and 500 mb are correlated with those at other levels. *Subject Headings:* **1. Upper air temperature changes 2. Precipitation effects 3. Vienna.**—*C.E.P.B.*

## SOIL TEMPERATURE

*See:* **Frost penetration problem** (Jumikis), 8.5–119.

## WATER TEMPERATURE

*See also:* **Temp. of coastal waters, Madras** (Chacko), 8.5–87; **Temp. and salinity anomalies, Irish Sea** (Goedecke), 8.5–88; **Air-sea temp. difference and wave generation** (Fleagle), 8.5–89.

# PRESSURE AND WIND

## PRESSURE

*See also:* **Temp. correction for pressure measurements** (Pauly), 8.5–157; **Mean tropopause pressure and temp.** (Moore), 8.5 174; **Surface pressure changes** (Huber-Pock), 8.5–196; **Duststorm, Iraq** (Abdullah), 8.5–234.

8.5–224 551.541:551.515.4(728)

Portig, Wilfried, **Tropengewitter.** [Tropical thunderstorm.] *Meteorologische Rundschau*, 9(11/12):221–223, Nov./Dec. **1956.** fig. **DWB**—A thunderstorm at San Salvador on Aug. 24, 1956, brought a sharp rise and fall of the barograph by 1.0 mb. Curves at 4 places are shown and discussed. It was quickly followed by a flash to a lighting wire. Storms with much lightning give little rainfall; heavy rains falls with only "grumbles." Some comments on aerology and observation of thunder in the tropics are made for the proposed I.G.Y. investigation. *Subject Headings:* **1. Pressure jumps 2. Thunderstorms in tropics 3. San Salvador.**—*C.E.P.B.*

8.5–225 551.541:623.454.8

Schlegel, Max, **Weitere Beobachtungen von Druckwellen bei Wasserstoffbombenexplosionen im Frühjahr 1954.** [Further observations of pressure waves from hydrogen bomb explosions in spring 1954.] *Meteorologische Rundschau*, 9(11/12):223–224, Nov./Dec. **1956.** 2 figs., 3 refs. **DWB**—Microbarograms for March 1 and 27, April 26 and May 5, 1954, at Königstein and March 1 at Oberstdorf are reproduced to show waves from H-bomb explosions at Bikini. The mean wave velocity was 291–324 m/s. *Subject Headings:* **1. Bikini atom bomb effects 2. Pressure waves.**—*C.E.P.B.*

8.5–226 551.543.1:551.588.2

Pyle, Robert L., **The 24-hour component of the diurnal pressure oscillation on Haleakala Mountain, Hawaii.** California. Univ. at L. A. Institute of Geophysics. Oahu Research Center, Contract AF 19(604)-546, Scientific Report, No. 15, Nov. **1955.** 12 p. 7 figs., table, foot-refs. **DWB**—The 24-hour component of the diurnal pressure oscillation was measured at eleven stations between sea level and 10,000 ft, and was found to vary greatly with altitude and with orographic exposure. An abrupt shift of phase occurs near 2000 ft elevation, with the time of maximum occurring in the early morning hours at low level stations and in the early afternoon at higher levels. Near sea level, the amplitude is smallest at the station exposed directly to fresh oceanic air, and is ten times larger at the station farthest removed from the ocean. At higher elevations the amplitude is largest just above the level of phase shift. It decreases markedly to a minimum at the base of the tradewind inversion near 6000 ft, but is larger again above 7000 ft. A possible physical explanation of these variations in terms of daily solar heating is discussed. Two main influences are suggested: an "orographic effect" arising from differential heating of land and water surfaces, and a "worldwide effect" which is independent of the character of the underlying surface. *Subject Headings:* **1. Diurnal pressure variations 2. Altitude effects on pressure variations 3. Haleakala Mt., Hawaii.**—*Author's abstract.*

8.5–227 551.547.5(98)

Heastie, H., **Average height of the standard isobaric surfaces over the north polar regions in January.** *Meteorological Magazine*, London, 85(1014):368–372, Dec. **1956.** 3 figs., 5 refs. **DWB**—Circumpolar charts, 56–90°N, of mean 500, 200 and 100 mb contours in Jan. 1949–53 are given and method of preparation described. The maps are briefly discussed. *Subject Headings:* **1. Standard isobaric surfaces 2. Arctic.**—*C.E.P.B.*

## WIND

*See:* **TWA wind component scale** (Browne, Corwin), 8.5–102; **Tropical circulation patterns** (Flohn), 8.5–195.

## TURBULENCE

*See also:* **Met. analysis of clear air turbulence** (Lake), 8.5–24; **Small and middle scale turbulence, Brookhaven** (Panofsky, Van der Hoven), 8.5–25; **Air safety** (Kirchner), 8.5–104; **Turbulent diffusion theories and atmos. pollution** (Saissac), 8.5–172; **Change of spectral distribution of kinetic energy** (Wippermann), 8.5–194.

8.5–228 551.551:551.557

Rutherford, G. T. (*Central Met. Bureau, Melbourne*), **Clear air turbulence in Australia.** *Australian Meteorological Magazine*, Melbourne, No. 12:61–71, March **1956.** 5 figs., table, bibliog. **DWB, DLC**—About 40 observations of moderate or severe high-level turbulence in clear air have been reported in Australia since Feb. 1953. These reports have been examined in relation to the relevant jet stream patterns, stability characteristics, pressure-height contours, fronts and topography, and the probable causes of the turbulence set out. *Subject Headings:* **1. Clear air turbulence 2. Upper air turbulence 3. Australia.**—*Author's abstract.*

8.5–229 551.551:536.7

Van Mieghem, J., [**Comments on Alfred K. Blackadar**] **Extension of the laws of thermodynamics to turbulent systems.** *Journal of Meteorology*, 13(6):600–601, Dec. **1956. Reply** by Blackadar, p. 601. 2 refs. **DWB**—Referring to Blackadar's paper in *J. Meteor.*, 12(2): 165–175, April 1955 (*see* 6.8–248, June 1955, *MAB*), Van Mieghem points out that he "never stated that the positive nature of the eddy-transformation function is a consequence of the second law." He makes other criticisms to which Blackadar replies categorically. *Subject Heading:* **1. Thermodynamics of the atmosphere.**—*C.E.P.B.*

8.5–230 551.551.8

Karplus, Walter J. and Allder, James R., **Atmospheric turbulent diffusion from infinite line sources: an electric analog solution.** *Journal of Meteorology*, 13(6):583–586, Dec. **1956.** 7 figs., 5 refs., 17 eqs. **DWB**—The steady-state distribution of particles emitted by an infinite line source in the presence of winds and atmospheric turbulence is determined by means of an electric analog approach. A logarithmic wind profile and a linear eddy-diffusivity profile are assumed, and a series of normalized curves relating the horizontal wind velocity, the vertical eddy diffusivity, and the source magnitude to the concentration in the horizontal and vertical direction are presented. A method for extending the technique to the treatment of finite line sources and point sources is indicated. *Subject Heading:* **1. Turbulent diffusion.**—*Authors' abstract.*

## WIND VARIATIONS AND SPECIAL WINDS

*See also:* **Ceiling-visibility-wind relationships** (Peterson), 8.5–106; **Snow shower during winter monsoon** (Iwata), 8.5–273.

8.5–231 551.553.12:697.8

Winter, Fritz, **Schornsteinrauch veranschaulicht das abendliche Einsetzen des Hangabwindes.** [Chimney smoke shows the evening setting in of the katabatic wind.] *Meteorologische Rundschau*, 9(11/12):224, Nov./Dec. **1956.** 6 figs. **DWB**—Six photos between 19 h and 20 h 25 m on July 7, 1956, near Heidelberg clearly show the gradual reversal of wind direction. At one chimney, half the height of the other three, the slope wind set in more than half an hour earlier. *Subject Headings:* **1. Slope winds 2. Smoke plumes 3. Heidelberg, Germany.**—*C.E.P.B.*

8.5–232 551.553.8:551.515:551.43(521.2)

Akita, I., **On the gust occurred in the Northern Kanto Plain.** *Journal of Meteorological Research*, Tokyo, 7(12):785–789, Jan. **1956.** 4 figs., 4 refs. In Japanese; English summary p. 785. **DWB, DLC**—The gust which occurred in the northern Kanto plain on Feb. 5, 1944 is analyzed, using data of captive balloon observations up to 2 km above the ground taken at four stations in the Kanto Plain, and data from the regular surface observation network. The gust was preceded by the formation of a local orographic depression in the western part of the plain. There appeared a temperature inversion over Honjo, the layer descending

adually, and the surface temperature rose simultaneously with the passage of the gust. *ubject Headings:* **1. Gusts 2. Orographic depressions 3. Kanto Plain, Japan.**—*Author's stract.*

8.5–233 551.555.4(521.11)

Matsuzawa, I., **On the local wind, so-called "Yamase-Kaze" in Aomori Prefecture.** *urnal of Meteorological Research*, Tokyo, 8(4):245–247, June **1956.** 6 figs., table, 4 refs. In panese. **DWB, DLC**—A statistical study based on upper air wind data and frequencies of rface winds. *Subject Headings:* **1. Yamase winds 2. Wind frequencies 3. Aomori Prefecture, Japan.**—*M.R.*

8.5–234 551.555.8:551.541(567)

§Abdullah, Abdul Jabbar, **A severe duststorm in Iraq.** *Beiträge zur Physik der Atmosphäre*, rankfurt a.M., 29(1):21–36, **1956.** 5+ figs., 18 refs., 2 eqs. German, English and French mmaries p. 21. **DWB**—Severe duststorms are known to occur in several parts of the world. me suggestions have already been made by previous writers as to the possible mechanism their formation. In the present paper the physics of dustraising is reviewed. The hypothesis that severe duststorms of Iraq are associated with pressure-jump lines is advanced. case study is discussed in some detail in support of this hypothesis. This case occurred in aq on March 23, 1954. Fairly good agreement is found between theory and observation. *ubject Headings:* **1. Dust storms 2. Pressure jump line effects on dust storms 3. Iraq.** *-Author's abstract.*

8.5–235 551.555.8:551.515.4(54)

Upadhyaya, V. C. (*Phys. Res. Lab., Ahmedabad*), **Dust and thunderstorm on 23 March 954 at Ahmedabad.** *Indian Journal of Meteorology and Geophysics*, Dehli, 5(3):295–296, ly **1954.** fig. **DWB, DLC**—Note on dust squalls which blew 55 km/hr from SSE at 1630 h 15 h and 50–80 km/hr from WNW to SW at 1800 to 1815 h at Ahmedabad on March 23, 954. Barograph, thermograph, hydrograph and anemograph records are reproduced. *ubject Headings:* **1. Dust storms 2. Thunderstorms 3. Ahmedabad, India.**—*M.R.*

## WIND EFECTS

*See also:* **Air-sea temp. difference and wave generation** (Fleagle), 8.5–89; **Waves** (Poncelet), 8.5–92; **Wave obs., Arabian Sea** (Venkataraman), 8.5–93; **Height of wind-sea** (Walden), 8.5–94; **Ocean current theory** (Defant), 8.5–95; **Theory of unstable wind currents** (Lineĭkin), 8.5–98; **Wind driven currents** (Neumann), 8.5–99; **Route equivalent wind** (Crutcher), 8.5–103; **Cold wave** (O'Connor, Fean), 8.5–208; **Salt particles from seas** (Rau), 8.5–251; **Orographic clouds** (Eber, Seeley), 8.5–255.

8.5–236 551.556:532.593

Dmitriev, A. A. and Bonchkovskaia, T. V., **Vozdeĭstvie techeniĭ na volnovye dvizheniia idkosti.** [Effect of currents on wave movements in a liquid.] *Akademiia Nauk SSSR, vestiia, Seriia Geofiz.*, 4:360–374, **1954.** 7 figs., 7 refs., 45 eqs. **DLC**—The author presents e theoretical solution of the problem of wave movements in fluids arising in the case of the essure exerted by a wind current the speed of which varies with height. Experimental vestigations of the movement of particles in forced waves are described. These were carried ıt in transparent tanks using the methods of light polarization and photographing the beavior of emulsion particles in the fluid. An actual theoretical solution with experimental arameters and with schematic drift velocities close to these obtained experimentally is deeloped. *Subject Headings:* **1. Wave motion 2. Wind wave formation.**—*Based on author's stract.*

8.5–237 551.311.3:551.556:533.17

Matschinski, Matthias, **Propriétés intégrales des champs et exemples de fonctionnelles n mécanique des fluides: solidification de sols et érosion par vent.** [Integral properties fields and examples of functionals in fluid mechanics: solidification of soils and wind erosion.] *cadémie des Sciences, Paris, Comptes Rendus*, 242(13):1683–1686, March 26, **1956.** 4 figs.,

6 refs., 2 eqs. **DLC**—The author's theory of velocity fields treated as functionals is summe up and two examples of its application are given. One of the applications concerns the three cornered rocks formed by wind erosion. According to the author's theory a single prevailin wind direction may account for the formation of such rocks, instead of two prevailing direction as assumed by geologists who believe that wind erosion acts only on a surface normal to th wind. *Subject Headings:* **1. Wind erosion 2. Flow dynamics.**—*G.T.*

8.5–238 551.556:595.7

Nitto, Masatoshi and Tachibana, Kanji, **Influence of the wind on the dispersion of th chestnut gall wasp.** *Tokyo. Forest Experiment Station, Bulletin*, No. 83:89–98, Jan. 1956 7 figs., 2 tables, 8 refs. In Japanese; English summary p. 98. **DWB**—Studies of dispersal o chestnut gall wasps by prevailing winds, and wind tunnel tests, indicated that long distanc dispersal of wasps occurs during weak winds (0.15∼0.45 m/sec) when the adult wasps fly upward and are carried to leeward by stronger winds. When surface winds are stronge (0.8–2.3 m/sec) the wasps cling to the substratum, but with winds of >3.15 m/sec they are blown away. Curves show relationships of wind (duration, speed, etc.) to dispersal. A chart shows northward spread of wasps in the Kanto plain during 1952 and 1953, respectively. *Subject Headings:* **1. Aerobiology 2. Wind dispersal of wasps 3. Forest entomology.**—*M.R.*

8.5–239 551.556.3

Vinter, Aleksandr Vasil'evich, **Energiia vetra i perspektivy ee ispol'zovaniia.** [Wind energy and prospects of its utilization.] Moscow, Izdatel'stvo "Pravda," **1951.** 23 p. 3 refs. At head of t-p: Vsesoiuznoe Obshchestvo po rasprostraneniiu politicheskikh i nauch nykh znanii. **DLC**—A popular account of the economic importance of wind energy to the national economy of the U.S.S.R., its relative cost as compared with coal and oil, and its application to various aspects of economic activity; brief descriptions of various types of wind energy devices; and a listing of the regions of the U.S.S.R. where wind energy can be utilized most efficiently, namely the Far East, Eastern Siberia, Kamchatka, Sakhalin, Kara Kum and the Caspian Sea region. *Subject Headings:* **1. Wind utilization 2. U.S.S.R.**—*I.L.D.*

8.5–240 551.556.4:551.311.3

de Felice, Pierre, **Processus du soulèvement des grains de sable par le vent.** [Processes of the lifting of sand grains by the wind.] *Académie des Sciences, Paris, Comptes Rendus*, 242(7):920–923, Feb. 13, **1956.** 5 figs. (incl. photos.). **DLC**—The forces which raise and support a grain of sand from the ground were studied in a wind tunnel 20 cm sq and 1 m long, with speeds from 0 to 20 m/s and with a very slick bottom. The wind speed is uniform except in the marginal 0.1 cm, spherical sand grains 0.02 cm in diameter were used in a manner to prevent interaction. The lifting speed reached 5.5 m/sec. The streamlines around the grains are sketched, showing that at first (up to 0.02 cm) the lifting force is a Bernoulli effect (a vacuum is produced above the grain, due to the wind gradient), whereas from 0.02 cm to the maximum height, a "Magnus-Bernoulli" effect operates, as there is no wind gradient and the sand grain rotates at a speed of 350/sec to 500/sec. *Subject Headings:* **1. Wind effects on sand grains 2. Wind gradient.**—*M.R.*

8.5–241 551.556.4:551.311.33:631.4

Hjulström, Filip; Sundborg, Åke and Falk, Åke, **Problems concerning the deposits of windblown silt in Sweden.** *Geografiska Annaler*, Stockholm, 37(1/2):86–117, **1955.** 11 figs., numerous refs., 13 eqs. **DLC**—The first chapter, **The problem of the geographic location of wild-blown silt: an attempt at an explanation,** is a review of the literature on loess formation in Sweden and of the various explanations offered for its formation. The second chapter, **Methodological and climatological conditions for the genesis of Aeolian sediments,** contains a mathematical discussion of general conditions for the initiation of material transport by wind and of concentration of material within different grain sizes at different elevations above the ground, and a consideration of the turbulent diffusion of the material, deflection from the direction of the wind near the earth's surface and of weather situations favorable to the formation of wind sediments. *Subject Headings:* **1. Wind driven silt 2. Loess 3. Sweden.** —*I.L.D.*

8.5–242 551.556.4:551.311.31

Kotze, J. J., **Pictorial record of a drift sand reclamation task at Blaauwberg, C. P.** *South African Forestry Association, Pretoria, Journal*, No. 25:52–57, 1955. 10 plates (photos). **DWB**—A series of 10 photos shows the early (1939) unsuccessful attempts to combat sand drifting over valuable private property by planting a belt of marram grass, later (1940) creation of a barrier dune by erecting a barrier of poles and brush, then (1941) several barriers close together as the first is engulfed, and still later (1943) stabilization of the dune, with perpendicular rows of grass on the lee face and crest. After 7 years (1951) the dune was completely stabilized and the land in the lee protected from sand so reclamation was complete. Sand in this region is drifted by prevailing SE winds in this coastal part of Cape Province. *Subject Headings:* **1. Sand dune stabilization 2. Sand drifting 3. Blaauwberg, Union of South Africa.**—*M.R.*

## UPPER AIR WINDS

*See:* **Met. analysis of clear air turbulence** (Lake), 8.5–24; **Upper air wind data, Mawson** (Dingle), 8.5–35; **Symposium-ionospheric drifts,** 8.5–64; **Upper air wind measurement** (aufm Kampe), 8.5–149; **Tropopause height and stratos. easterlies** (Jordán), 8.5–173; **Clear air turbulence** (Rutherford), 8.5–228.

## VERTICAL MOTION

*See:* **Heavy rainfall, Kyushu District** (Nagayama), 8.5–269.

# AQUEOUS VAPOR HYDROMETEORS AND HYDROMETEOROLOGY

## HUMIDITY

*See also:* **Relative humidity in forestry** (MacHattie), 8.5–115; **Work done in 1948–49 at Shiozawa Lab. of Snow** (Shoda), 8.5–274.

8.5–243 551.571.36(411)

Smith, Ralph C., **Another remarkable low humidity.** *Weather*, 12(1):33, Jan. **1957. DWB**—At Kinloss, Scotland, on June 10, 1956, relative humidity fell to 18% at 16 h. The synoptic sequence showed that air between 400 and 600 mb descended to ground level. *Subject Headings:* **1. Humidity extremes 2. Scotland.**—*C.E.P.B.*

## EVAPORATION AND EVAPOTRANSPIRATION

*See:* **Evaporation from Indian Ocean** (Venkateswaran), 8.5–86; **Mean total evaporation calculation** (Mezentsev), 8.5–133; **Evaporation from small catchment** (Niinivaara), 8.5–134; **Estimating areal evaporation** (Täumer), 8.5–135; **Hydrologic physics** (Philip), 8.5–290; **Effect of roof cooling on room temp.** (Bacon), 8.5–302.

## CONDENSATION

8.5–244 551.574.1

Crider, Walter L.; Milburn, Richard H. and Morton, Stephen D., **The evaporation and rehydration of aqueous solutions.** *Journal of Meteorology*, 13(6):540–547, Dec. **1956.** 5 figs., table, 10 refs., 26 eqs. **DWB**—The increase of mass of a NaCl particle rehydrating at various humidities 80–100% was measured with a quartz-fiber microbalance. The apparatus is illustrated. The theory of evaporation and rehydration of a spherical droplet is set out and an equation (17) derived for the time taken for a given change of concentration. The observations agree reasonably well with theoretical values, after correcting for some uncertainties. The theory is extrapolated to aerosol particles in meteorological clouds, and it is considered that the theoretical curves for 99–100% r.h. accurately represent the rehydration of NaCl particles down to radii of about 0.1$\mu$. *Subject Heading:* **1. Saline nuclei.**—*C.E.P.B.*

8.5–245 551.574.1:551.594.12

Kano, M., **Does the forced diffusion of water vapor due to the electric field of a small charged droplet affect on its growth?** *Journal of Meteorological Research*, Tokyo, 7(12):779–784, Jan. **1956.** fig., table, 4 refs., 19 eqs. In Japanese; English summary p. 779. **DWB, DLC**—As an example of the effect of forced diffusion of water vapor on the growth of a small charged droplet, the effect due to the interaction between the electric dipole of water vapor molecules and the electric field of a charged (one electronic unit) droplet into which the vapor molecules condense is examined. The result obtained is that the effect of forced diffusion is not noticeable for the growth of nuclei of ordinary size ($10^{-6}$ cm). *Subject Headings:* **1. Droplet growth 2. Charged droplets.**—*Author's abstract.*

8.5–246 551.574.1:621.385.833

Lodge, James P. and Tufts, Barbara J. (*Cloud Physics Project*, Chic. Univ.), **An electron microscope study of sodium chloride particles as used in aerosol generation.** *Journal of Colloid Science*, 10(3):256–262, June, **1955.** 3 figs., 6 refs. **DLC**—The effects of temperature, moisture, and filament age on sodium chloride particles evaporated from the hot-wire source used in the La Mer generator were studied with the RCA EMU-2E electron microscope. The size appears to vary with temperature and filament age, and concentration seems to be a function of temperature. The shape of the sodium chloride crystals is related to the amount of moisture present. The variation of particle size with filament age appears to yield smooth curves, implying an orderly change. This is attributed to crystal growth in the coating of the hot wire. *Subject Headings:* **1. Saline nuclei 2. Electron microscopy.**—*Author's abstract.*

8.5–247 551.574.1:551.577:551.510.42

Neuwirth, R., **Luft- und niederschlagschemische Untersuchungen in Südschwarzwald.** [Investigations of chemistry of air and precipitation in the southern Black Forest.] *Meteorologische Rundschau*, 9(11/12):215–218, Nov./Dec. **1956.** 6 figs., 10 refs. **DWB**—As part of the international plan for chemical analysis of air and rain, stations were set up at Günterstal near Freiburg (300 m) and on Feldberg (1493 m). Observations June 1955–May 1956 are discussed. Sodium, chloride, sulfur and ammonia concentrations are plotted monthly; ratio of Cl to Na reaches a maximum with SW–W air masses. Cl-ions at Günterstal reach a maximum in precipitation with NW-SW currents but local influences cause irregularities. Basel affects the sulfur and ammonia content on Feldberg with SW-S winds. Acidity is less at Feldberg than Günterstal in fall; in Feb.–April the curves are discrepant. *Subject Headings:* **1. Saline nuclei 2. Atmospheric pollution 3. Black Forest, Germany.**—*C.E.P.B.*

8.5–248 551.574.1:551.509.67

Pruppacher, Hans Rudolf and Sänger, Raymund, **Mechanismus der Vereisung unterkühlter Wassertropfen durch disperse Keimsubstanzen, I, Experimentelle Untersuchungen über die Eiskeimfähigkeit der Stoffe.** [Freezing mechanism of supercooled water drops by dispersed nuclei, Pt. 1. Experimental investigations on the nucleating ability of substances.] *Zeitschrift für angewandte Mathematik und Physik*, Basel, 6(5):407–416, **1955.** 3 figs., ref. English summary p. 416. **DLC**—A systematic laboratory investigation of the icing nucleability of 104 substances, of which 43 were found active above −18°C. Temperatures for the formation of first ice crystals and complete icing of a fog are listed. The following substances gave a nucleability at −4° to −7°C: β-, γ-, AgI, $Ag_2S$, CuI, CuS, CuSe, CdTe, $PbI_2$, $V_2O_5$, HgTe, $Ag_2O$, $Cu_2O$, CdSe, $AgNO_3$. The best seems to be CuS with slightly better nucleability than AgI, a material much less expensive and more permanent than the widely used AgI. Experimental procedure is described in detail. No distinguished crystallographic influence has been found, but the polarization capacity of anions in the given substance seems to be a favorable factor. *Subject Headings:* **1. Nucleation 2. Cloud seeding 3. Cloud physics.**—*A.A.*

8.5–249 551.574.1:551.509.67

Pruppacher, Hans Rudolf and Sänger, Raymund, **Mechanismus der Vereisung unterkühlter Wassertropfen durch disperse Keimsubstanzen, II, Zur Deutung der Eiskeimfähigkeit der Stoffe.** [Mechanism of freezing of supercooled water drops by disperse nuclei, Pt. 2,

etermination of the effectiveness of ice nuclei.] *Zeitschrift für angewandte Mathematik nd Physik*, Basel, 6(6):485–493, **1955.** fig., 17 refs. **DLC**—The results of the measurements ublished in the first part of this report (*see* 8.5–248 above) are compared to the existant ttempts at explanation of the ice nucleability of substances. Of these only the interpretation the nucleability of supercooled clouds proposed by WEYL can, somewhat extended, be eemed to fit actual observations. It is found in the case of 2-atomic seeding substances hat one of the elements (the one on the left-hand side of the periodic system) must be remarkbly less polarizable than the partner (on the right-hand side of the periodic system). Another haracteristic property of the seeding substances found to be active is their non-solubility in ater. The forces responsible for the nucleability of the substances are those which also etermine the structure of the surface of the seeding particles and of the water droplets. *ubject Headings:* **1. Freezing nuclei 2. Nucleation theory.**—*Authors' abstract.*

8.5–250 551.574.1

Rau, Walter, **Bestimmung der Grösse und Häufigkeit der Chloridteilchen im maritimen erosol.** [Determination of the size and frequency of chloride particles in maritime aerosol.] *leteorologische Rundschau*, 9(11/12):210–214, Nov./Dec. **1956.** 5 figs., table, 18 refs. **DWB** – bservations of number and size distribution of chloride particles were made at Hamburg nd Cuxhaven on the North Sea coast for comparison with those at Weissenau. The maximum as 12 particles per cm³, but number was generally around 2. The radius was generally round 0.2$\mu$; in more than half the observations radii $>0.5\mu$ were almost absent. The rare iant particles reached 3–3.5$\mu$ compared with 1–2$\mu$ inland. With wind 8–10 m/s drops of pray fell out within 70 m of shore. Saline nuclei in air would give about 2 mg per liter of ain water, which agrees with observation. Results of other investigators are compared. *ubject Headings:* **1. Saline nuclei 2. Maritime aerosol 3. Germany.**—*C.E.P.B.*

8.5–251 551.574.1:551.556.4:551.46

Rau, Walter, **Experimentelle Untersuchungen über die Erzeugung von Salzteilchen aus en Meeren.** [Experimental investigations on the production of salt particles from the sea.] *eofisica Pura e Applicata*, Milan, 33:113–120, **1956.** 4 figs., 13 refs. English and French ummaries, p. 113. **DLC**—The processes essential for the production of salt-particles from the ea are investigated, the particles being identified and measured according to VITTORI. Burstng air bubbles are shown to be mostly ineffective. The number of produced particles increases apidly with accelerating velocity of spraying. Populations of $10^6$ per cm³ of air blown through he water are possible. The results are discussed with regard to the arguments stated pro nd contra the hypothesis of KOHLER and to the chloride contents of the atmosphere. *Subject Headings:* **1. Saline nuclei origin 2. Sea spray.**—*Author's abstract.*

8.5–252 551.574.2:551.509.67:551.521.63

Picca, Robert, **Nouvaux essais de désactivation de l'iodure d'argent en tant qu'agent laçogène.** [New experiments on the de-activation of silver iodide as an icing agent.] *Acaémie des Sciences, Paris, Comptes Rendus*, 241(4):489–492, Jan. 23, **1956.** 4 foot-refs. **DLC.** lso issued as *Puy-de-Dôme. Observatoire, Publications*, No. 2A, **1956. DWB**—A cloudhamber experiment is described in which silver iodide nuclei suspended on spider webs were ubjected to various treatments and the effect of these treatments on the icing properties of the uclei was observed. Condensation followed by evaporation totally de-activated 35% of the uclei, partially de-activated 60% while 5% remained active. The same figures apply to nelting of ice crystals followed by their evaporation. For sublimation the number of totally le-activated nuclei is 25%, partially 50%, active 25%. For condensation only: total deictivation 15%, partial 35%, active 50%. For melting: partial de-activation 60%, active 0%. Placing the de-activated nuclei in a vacuum for one or two hours failed to re-activate hem. Under ultraviolet light the active nuclei lost their icing properties after exposure round 30 minutes. The author further mentions experiments in which the aging of AgI uclei was investigated and which showed 90% de-activation after 5 days, 95% after 10 lays and total de-activation after 10 to 20 days. *Subject Headings:* **1. Silver iodide properties . Ultraviolet effects.**—*G.T.*

8.5–253 551.574.42:621.316(411)

Phillips, P. E., **Icing of overhead high-voltage electric power lines in the Grampians.** *Meteorological Magazine*, London, 85(1014):376–378, Dec. **1956.** 2 photos. **DWB**—Two sections, Fort Augustus to Laggan Bridge, rising to 2507 ft, and Cock Bridge to Tomintoul, rising to 2170 ft, suffered failures through icing on March 19–21, 1956. Wind was E–SE and freezing level 1000–2000 ft with thick low stratus. Radial thickness of ice was up to 3″, causing conductors to sag. *Subject Headings:* **1. Icing of power lines 2. Scotland.**—*C.E.P.B.*

## CLOUDS

8.5–254 551.576.1

Woodley, K. E., **Unstable cloud layer.** *Meteorological Magazine*, London, 85(1014):374, Dec. **1956.** 4 photos. **DWB**—Four photos are reproduced showing rapid development of a large cirriform cloud at Richmond, Surrey, on July 8, 1956, into ACu floccus. *Subject Heading:* **1. Cloud development.**—*C.E.P.B.*

8.5–255 551.576.11:551.556.21

Eber, Laurence E. and Seely, Ben K., **A chemical tracer experiment in orographic clouds.** *Journal of Meteorology*, 13(6):548–553, Dec. **1956.** 6 figs., table, 2 refs. **DWB**—Tests were carried out by spraying water containing copper sulfate into cloud formed by a nearly vertical 1500 ft cliff normal to trade wind in Maui, Hawaii. The droplets were sampled by filter papers exposed at a number of sites down-wind, which showed the spray plume to have an angular width of 30°. The stream lines were constructed from time-lapse movies. Size distribution of droplets (shown by histograms) indicates an increase of median diameter down-wind; drops <0.156 mm decreased from 58% near spray to 33% a few miles away. The most favorable conditions for spraying occurred with moderate cloud and little or no rain. *Subject Headings:* **1. Orographic cloud coalescence 2. Hawaii.**—*C.E.P.B.*

8.5–256 551.501.81:551.576.11

Langleben, M. P., **The plan pattern of snow echoes at the generating level.** *Journal of Meteorology*, 13(6):554–560, Dec. **1956.** 10 figs., 11 refs. **DWB.** Also issued as McGill Univ. Macdonald Physics Laboratory, Contract AF 19(122)-217, Scientific Report, No. MW-24, Feb. **1956.** 15 p. 10 figs., 11 refs.—Scanning with radar antenna rotating about a vertical axis at an angle of elevation gradually increasing from 0–10° at 75 mi range, photographed on film, enabled maps of echoes at any height to be constructed. Examples for 7 days in winter 1954–55 are shown. On 5 there was a tendency for several hundred small generating elements to be arranged at intervals of 2–4 mi on lines 25–100 mi long 6–20 mi apart. In 2 cases distribution was random. Individual cells were of the order of 1 mi across and persisted for hours, moving with the wind at generating level. Orientation of lines was a linear function of component of wind shear along wind direction. Below the generating level the echoes increased in horizontal area due to spreading by wind shear. Precipitation area was 10–20 times area of echo at generating level. *Subject Headings:* **1. Radar echoes from clouds 2. Cumulus cloud lanes.**—*C.E.P.B.*

## PRECIPITATION

*See also:* **Armagh Obs. precip. records** (Lindsay), 8.5–55; **Precip. variation measurement** (Hiatt, Schloemer), 8.5–130; **Precip. statistics** (Essenwanger), 8.5–131; **Rainfall cycles, Calif.** (Lane), 8.5–164; **Long waves and belts of max. westerlies** (Kamiko), 8.5–197; **Surface streamlines and torrential rains** (Mook), 8.5–203; **Temp. changes in free atmos. during precip.** (Steinhauser), 8.5–223; **Chemistry of air and precip.** (Neuwirth), 8.5–247; **Restricted and diffuse vegetation of Sahara** (Monod), 8.5–310; **Influence of meteoritic dust on rainfall** (Levert), 8.5–320; special bibliography on **Hydrologic Forecasting**, p. 657.

8.5–257 551.501.4:551.577(773):519.2

Neill, J. C. (*State Water Survey, Urbana, Illinois*), **Reliability of areal mean rainfall estimates.** *American Geophysical Union, Transactions*, 36(6):1085–1086, Dec. **1955.** 2 figs. 2 refs., 3 eqs. **DWB, DLC**—Values for reliability of areal mean rainfall estimates comparable

with those obtained by LINSLEY and KOHLER (1951). A sample from 198 summer storms in a 100 sq. mi. area of central Illinois, using 20 gages, was used in the computations. A graph shows variation of standard deviation $s$ with $P$ for various gage densities ($n=1$, 2, 3, 5 and 10). Another graph shows 95% confidence bands for 100 sq. mi. mean rainfall for various values of $n$. 94% of sample values fell within $P+2s$. *Subject Headings:* **1. Rainfall estimate reliability 2. Areal mean rainfall 3. Central Illinois.**—*M.R.*

8.5–258 551.577.22(432)

Wehner, Hans, **Auswertung der täglichen Niederschlagszeiten.** [Evaluation of daily rainfall periods.] *Zeitschrift für Meteorologie*, 10(9):280–281, Sept. **1956.** 2 tables, 3 refs. **DLC**—At Wahnsdorf, Dresden, representative of German lowlands, rainfall duration in minutes was evaluated for each day, 1946–55. Average values in hrs per day are given for each 10-day period, varying from 5.58 in Feb. 1–10 to 1.38 in Aug. 1–10. Singularities are well brought out and are discussed. *Subject Headings:* **1. Rainfall duration 2. Dresden, Germany.**—*C.E.P.B.*

8.5–259 551.577.36:551.579:551.311.2

Berkaloff, E.; Mauduech, E. and Tixeront, J., **Erosion en Tunisie: observations sur les apports solides des cours d'eau.** [Erosion in Tunisia: observations on the transport of solids in water courses.] *Tunis. Direction des Travaux Publics, Études, Ser.* 1, *Hydraulique et Hydrologie*, No. 4, **1954.** 19 p. 3 figs., 8 tables, 6 refs. **DLC**—In the introduction, monthly, seasonal and annual rainfall and temperature for Tabarca, Bargou and Kairouan are tabulated for 1901–50 (Bargou 1901–40 and precipitation only), and the monthly and annual frequency of monthly and daily precipitation amounts in various class intervals for 1900–1940 given for the 3 stations in greater detail. The data are analyzed in connection with the runoff, erosion and sediment load in the three basins of Northern Tunisia. *Subject Headings:* **1. Rainfall frequencies 2. Soil erosion 3. Tunisia.**—*M.R.*

8.5–260 551.577.36:519.2

Glover, J.; Robinson, P. and Taylor, J., **Assessing the reliability of rainfall if monthly falls are not independent.** *Journal of Agricultural Science*, Cambridge, Eng., 46(4):387–388, Nov. **1955.** 3 tables, 3 refs. **DLC**—The probability that rainfall in a given month will exceed a certain minimum is given by the probability if all monthly falls were independent, with a correction for correlation between rainfalls of neighboring months. An example is given, but since correlations are small, the correction is probably unnecessary. *Subject Heading:* **1. Rainfall reliability estimation.**—*C.E.P.B.*

8.5–261 551.577.37/8

§Roe, Charlotte and Vederman, Joseph (*WBAN Analysis Center, U. S. W. B., Wash., D. C.*), **September rains in the southwestern United States.** *Monthly Weather Review*, 80(9): 156–160, Sept. **1952.** 12 figs., table, 4 refs. **DWB**—An isohyetal, synoptic and aerological analysis of the condition which prevailed from Sept. 19 to 23, 1952 in the southwestern United States, during which time the drought of Aug. and early Sept. was broken. Many areas of northern Arizona had 1–2½ inches of rain—heavier amounts occurring in the highlands. The rain area extended from southern California across to Central Texas. *Subject Headings:* **1. Synoptic aerological studies 2. Southwestern United States drought (1952) 3. Rainstorms 4. Arizona.**—*M.R.*

8.5–262 551.577.37:551.577.38(728)

*Dieterichs, Heinz, **Frequency of dry and wet spells in San Salvador.** *Geofisica Pura e Applicata*, Milan, 33:267–272, **1956.** 8 tables, 5 refs. English and Spanish summaries, p. 267. **DLC**—A study of the daily rainfall in San Salvador (El Salvador) has been made over a thirty year period 1918–47 in order to determine the dry and wet spells. It has been found that the extreme dry spells on the Pacific Coast of Central America last longer than in other climates, studied by HUTTARY. The occurrence of a dry spell in San Salvador lasting over half a year is minutely examined, and the cause of its origin traced to orographic effects during northerly winds. *Subject Headings:* **1. Rainy spells 2. Dry spells 3. San Salvador.**—*Author's abstract.*

8.5–263 551.577.37(45) 551.577.38(45) 551.524.35(45

*Guerrieri, Eugenio, **Anomalie climatologiche osservate a Napoli tra il 1948 ed el 1950** [Climatological anomalies observed at Naples, 1948–1950.] *Naples. Osservatorio Astronomico di Capodimonte, Contributi Geofisici*, Ser. 2, No. 11:185–196, **1951.** graphs, 3 tables Also: **Abbondanza e deficienza di pioggia dal 1949 al 1951: temperature straordinarie nell' estate del 1952.** [Abundance and deficiency of rain from 1949 to 1951: extraordinary temperatures in the summer of 1952.] *Ibid.*, No. 12, **1953.** 2 tables. **DWB.** Reprint from *Accademia di Scienze Fisiche e Matematiche, Napoli, Rendiconti*, Ser. 4, 18:185–196, 195 and 20:201–209, **1953. DLC**—In the first article the unusual and persistent drought of Nov 1948 to July 1949, and the hot spring and torrid summer of 1950 in Naples (using records mad at the Capodimonte Observatory) are analyzed statistically and compared with records goin back to 1866. The spring and summer of 1950 were among the hottest in 80 years. In th second article, the persistent drought of Nov. 1948 to July 1949, the torrential rains of 1950–5 winter and heat wave of the summer of 1952 in Naples and vicinity are discussed and th monthly and decadal values of precipitation (total, anomaly and number of days and anomaly and daily and 5-day mean temperatures and departures from normal (during hot period) ar tabulated and analyzed statistically. *Subject Headings:* **1. Drought, Naples (1948–49) 2. Ho spells, Naples (1952) 3. Floods, Naples (1950–51) 4. Rainfall anomalies 5. Naples, Italy** —*M.R.*

8.5–264 551.577.3

§Hughes, Grover D. and Roe, Charlotte L. (*U. S. Weather Bureau*), **Heavy rainfall durin mid-January along the Pacific Coast.** *Monthly Weather Review*, 81(1):20–25, Jan. 1953 9 figs., table, 8 refs. **DWB**—Mid-Jan. 1953 was characterized by a steeper than norma gradient between the North Pacific High and the Aleutian Low, which resulted in a series c migratory cyclones with heavy rainfall over the northwest coast of the United States and hig water records in many rivers, earth slides, washouts and considerable property damage. Th report gives surface and tropospheric pressure maps and precipitation at selected stations *Subject Headings:* **1. Synoptic studies 2. Excessive rainfall 3. Floods 4. Pacific Northwes Coast, United States.**—*A.A.*

8.5–265 551.577.37:551.579.

§Landers, H. and White, Hugh S., **Some meteorological conditions asssociated with th rainfall resulting in the Kansas City flood of July 13, 1951.** Florida. State University Dept. of Meteorology, Contract NONR-158(00), Project NR 082 071, Technical Report, Oct 15, **1952.** 34 p. 22 figs., 2 tables, 9 refs. **DWB**—Major damage (a billion dollars) wa caused in the industrial areas of Kansas City (Kansas and Mo.). Diurnal maximum precipita tion occurred around 3 a.m. in conjunction with diurnal maximum precipitation in northwar component of wind up a stationary frontal slope. In East Kansas runoff was 100% on th last day. U. S. Weather Bureau rain gages in NE Kansas registered >15 inches of rai (unofficial gages >17″) in the 5-day period July 9–13, 1951. Surface and 700 mb synopti analyses for July 10–13 are included. Also streamline and horizontal convergence-divergenc charts for 10,000 feet level for each day. *Subject Headings:* **1. Excessive rainfall 2. Kansa City flood—July 1951 3. Streamline analysis 4. Floods 5. Kansas City, Mo. 6. Kansas** —*M.R.*

8.5–266 551.577.37:551.579.4(773

*§Larson, Bernt O.; Hiser, Homer W. and Daniels, Warren S., **Storm of July 18–19, 1952 Rockford, Illinois and vicinity.** *Illinois. State Water Survey Division, Report of Investigation* No. 24, **1955.** 14 p. 15 figs. (incl. photos), 2 tables, 3 refs. **DWB**—Details of synopti conditions, rainfall for 6 and 36 hours as measured at 3 regular and 50 unofficial points, an runoff, damage and other incidents of the storm of July 18–19, 1952 which centered right ove Rockford, Ill., and suburbs. A previous storm (July 8, 1951) was covered by 350 points (about 50 recording and nonrecording gages), but it was mainly in rural area. The 1952 stor yielded >12 inches of rain in many places in the first 6 hours, and >15 inches in one area fo 36 hours. One small creek (Pelley Road Creek) had a discharge of 1230 cu ft/sec/sq mi whic exceeded all previous discharges for any Illinois creek. *Subject Headings;* **1. Excessive rainfa 2. Floods, Rockford, Ill. (July 1952) 3. Rockford, Ill.**—*M.R.*

8.5–267 551.577.37(764)

§Lott, George A. (*Hydrologic Ser. Div., U. S. W. B., Wash., D. C.*), **Rain storm of September 9–10, 1952.** *Monthly Weather Review*, 80(9):161–163, Sept. 1952. 8 figs. **DWB** A brief synoptic and upper air analysis of a case of heavy local rain in Central Texas on Sept. 9–10, 1952. In two days a total of 21 inches was recorded in the San Antonio region. *Subject Headings:* **1. Synoptic studies 2. Excessive rainfall 3. Central Texas.**—*M.R.*

8.5–268 551.577.37:551.579.4

Miller, D. H. (*Coop. Snow Investigations*), **Rain-on-snow flood of 18–20 November 1950, Central Sierra Snow Laboratory: preliminary report and outline for investigation as of Nov. 1, 1950.** *U. S. Corps of Engineers and U. S. Weather Bureau, Office Memorandum*, Nov. 24, 1950. 12 p. tables, graphs. **DWB**—Preliminary account of a heavy rainfall on snow causing record breaking floods. Meteorological and hydrological conditions are briefly outlined with graphical representation of temperature, precipitation, snow cover and stream flow. *Subject Headings:* **1. Floods 2. Heavy rainfall on snow 3. Central Sierra. I. Central Sierra Snow Laboratory.**—*A.A.*

8.5–269 551.577.37(522):551.558.29:551.511

Nagayama, M., **Some considerations on the heavy rainfall over Kyushu District in the third decade of June 1953.** *Journal of Meteorological Research*, Tokyo, 8(2):84–93, March 1956. 7 figs., 11 refs., eqs. In Japanese; English summary p. 84. **DWB, DLC.** Also issued in *Oceanography and Meteorology*, Nagasaki, 7(1/4), June 1956, Paper no. 5.—Upper air soundings at Hitoyoshi on June 26, 1953 are analyzed mainly for horizontal and vertical wind velocity distribution. Ascending currents are found to be coincident with heavy rainfall. Abnormally high evaporation rate over the eastern China Sea and advective ascent resulting from horizontal convergence are believed to be important factors in the rainfall mechanism. *Subject Headings:* **1. Excessive rainfall 2. Vertical currents 3. Convergence 4. Kyushu, Japan.**—*Based on author's abstract.*

8.5–270 551.577.38

Everist, S. L. (*Queensland Govt. Botanist*), **Climatic indices in the study of drought.** *Australian Meteorological Magazine*, Melbourne, No. 11:69–74, Dec. 1955. 4 refs. **DWB**—The word drought is used to describe periods when crops fail or pastures die primarily because of dearth of moisture. The moisture requirements of different crops and pastures vary so widely that, unless the term be confined to those periods when there is no rain at all, there can be no universal definition of drought in terms of rainfall, temperature or evaporation. Conditions which would be considered a drought in one district would constitute a reasonably good season in another. Even at one place, criteria will vary with land utilization and drought must be considered as a deviation from a norm. Lack of rain is not the only factor which can induce drought. Sometimes when rainfall has been sufficient for normal production, other factors may drastically reduce soil moisture or damage vegetation and thus precipitate the onset of drought conditions. These factors include fire at a critical time, improper preparation of cultivated land, excess grazing pressure, light rain on dry grass and even failure to remove excess vegetation at a critical period. A drought so induced is just as real to the farmer or grazer as one brought about by lack of rain. *Subject Heading:* **1. Drought.**—*Author's abstract.*

## RAIN AND SNOW

8.5–271 551.578.11:539.16:546.22:551.521.64

Goel, P. S., **Radioactive sulphur produced by cosmic rays in rain water.** *Nature*, London, 178(4548):1458–1459, Dec. 29, 1956. fig., table, 4 refs. **DWB**—Rainwater at Banaras and Kodaikanal (India) was analyzed for total and radioactive sulfur. Tests showed the radioactivity was due to sulfur-35. Most if not all was caused by cosmic radiation. *Subject Headings:* **1. Radioactive sulfur 2. Cosmic ray effects 3. Rainwater analysis.**—*C.E.P.B.*

8.5–272 551.578.4:061.3 551.524.5:061.3

Eastern Snow Conference, 8th, 1951, Lake Placid, N. Y., [**Proceedings**]. [9 p.] Photostat of typescript. **DWB**—Those who attended are listed and reports of the various com-

nittees on proposed research projects in snow, ice and permafrost and hydrology given i discussion and outline. *Subject Headings:* **1. Snow, ice and permafrost conferences 2. Hy drology.**—*M.R.*

8.5–273 551.578.4:551.553.21(52

Iwata, I., **On the snow shower accompanying the winter monsoon in Northern Hokkaid** *Journal of Meteorological Research*, Tokyo, 8(2):119–122, March **1956.** 5 figs. In Japanes **DWB, DLC**—Data on upper-air temperature and wind are graphically presented for th winter 1953–54. Prevailing wind components are compared with snowfall occurrence. Hig rates of snowfall appear to coincide with peaks of S-N wind component, and to occur 2 or days after peaks of W-E wind component. *Subject Headings:* **1. Monsoon snowfall 2. Win variations 3. Japan.**—*G.T.*

8.5–274 551.578.41:551.57

Shoda, Mikio, **Report of work done in winter 1948/1949 at Shiozawa Laboratory of Snov No. 1.** *Seppyo* (*Snow and Ice*), Tokyo, 11(3):23–26, **1949.** figs. In Japanese. **DWB**– After presenting 10 research projects in his laboratory, the author gives a brief descriptio of the hygroscopic phenomena of snow. It is pointed out that during the period with sno cover, the water vapor pressure in the air remains rather constant (4.6 mm Hg). *Subje Headings:* **1. Snow research 2. Water content of snow 3. Water vapor.**—*H. Arakawa.*

8.5–275 551.578.42:551.588.2:551.581(7

Galway, Joseph G. (*U. S. W. B., Jacksonville, Fla.*), **Effect of altitude and latitude o New England snowfall estimates.** *Eastern Snow Conference, 9th, Springfield, Mass., 195. Proceedings*, p. 55–63. 4 tables, 2 refs. **DWB**—The effect of altitude on snowfall in Ne England varies from 1″ per 25′ increase in Maine to 1″ per 40′ in Mass. R. G. Stone i 1934 figured 1″ per 17½′, neglecting the latitude difference between the Mass. coast and Whi Mountains. The new formula presented by the author reduces the % of error so that 73 of the cases lie within 10% error, whereas Stone's formula allowed only 31% to be <10% erro Even so there are too many other factors to make this method satisfactory for estimati snowfall above 2000′. For instance, Mt. Washington has 176″, but by Stone's formu >400″ and by the new formula 260″—both far too high for much use. *Subject Heading* **1. Altitude effect on snowfall 2. Latitude effect on snowfall 3. New England. I. Ston R. G.**—*M.R.*

8.5–276 551.578.42:551.524.2(7

*Galway, Joseph G. (*W. B. Airport Station, K. C., Mo.*), **Statistical study of New Englan snowfall.** Wash., D. C., U. S. Weather Bureau, April **1954.** 5 sections (each section u paged), numerous tables and charts, bibliog. at end of first section. **DWB**—Factors affectir snowfall in New England (temperature, latitude, altitude, exposure, topography, instrument errors, human errors and period of record) are analyzed objectively to show that temperatu is the most important factor and that a rough formula showing an increase of one inch of sno for every 25′ of altitude can be used only as an indication of the order of magnitude of the sno cover to be expected (for skiing, say) on mountains when measurements are based on valle stations. Data for 160 cities and towns of New England, going back to the 1870's in son cases, are tabulated, analyzed and charted in every conceivable way, with respect to mean extremes and seasonal or regional variations. *Subject Headings:* **1. Snowfall in New Englan 2. Altitude effects on snowfall 3. Snowfall data 4. Temperature effects on snowfall 5. Ne England.**—*M.R.*

8.5–277 551.578.4

Shoda, Mikio, **Studies on settling forces of deposited snow.** *Researches on Snow a Ice*, Tokyo, No. 1:139–154, Nov. **1953.** 11 figs., 3 tables, 9 eqs. In Japanese. **DWB**—Th settling force due to deposited snow cover is roughly proportional to the total weight of sno cover, and the settling force attains its maximum value for installations 30–60 cm of heig above ground. Terminology for the mechanics of snow is rather confused in its meaning, unique terminology with a proper definition is proposed. Finally, density of snow at an

yer of snow cover is given in terms of the weight of the snow cover above that layer (Fig. 9), nd the mean density for the whole snow cover is computed for the snow cover at Tokamachi, 939-1951. For quite large depths of snowfall, the mean density for the whole snow cover xtends to the limit 0.43 gr/cm³. Quite clear study on the settling force of snow cover. *Subject Headings:* **1. Snow density 2. Snow pack 3. Snow mechanics.**—*H. Arakawa.*

8.5–278 551.578.46:551.43

Takahashi, Kihei, **Properties of snow deposited on mountain side.** *Researches on Snow nd Ice*, Tokyo, No. 1:207-210, Nov. **1953.** 4 figs., 2 tables. In Japanese. **DWB**—Observaonal materials on the water content, hardness and other properties of snow cover on the lope on both sunny and shady sides are given. *Subject Headings:* **1. Snow cover properties . Mountain effects.**—*H. Arakawa.*

8.5–279 551.578.46:551.311.128

Vrba, Miloš and Urbánek, Bedřich, **Zjišťování lavinového nebezpečí.** [Determination f avalanche danger.] *Meteorologické Zprávy*, Prague, 8(5):123-127, **1955.** 6 figs., table. ussian, English and German summaries p. 123. **DWB**—Describes theory and practice of the etermination of avalanche danger by making use of a ramsonde. The penetration resistance directly proportional to the hardness, specific weight, cohesion and adhesion of the snow ayers. On the basis of the penetration resistance of snow it is therefore possible to determine ith good approximation the type of the snow layers and the magnitude of forces compensating he tension of the snow cover on a slope, which is very difficult to measure. The mountain tations carrying out regular analysis of snow cover and making ramsonde measurements ompare the graphical results of these measurements with samples of typical avalanche ituations and evaluate the danger accordingly. *Subject Headings:* **1. Avalanche danger etermination 2. Ramsonde measurement.**—*Authors' abstract.*

8.5–280 551.578.46

Wilson, Walter T. and Gerdel, R. W., **Discussion of Gerdel's The transmission of water hrough snow.** *American Geophysical Union, Transactions*, 36(2):347–348, April **1955. )LC**—Wilson discusses Gerdel's use of term "Ripe" for snow pack which is ready to yield o the hydrologic processes in contrast to inert snow masses. By analogy, the term *rotten vater* or *green snow* could be used for water coming from over-ripe snow or for snow not yet ipe. Gerdel says this is merely semantics, and suggests "*immature snow*" for "unripe." *For abstract on original article, see* 6.2–274, Feb. 1955, *MAB.*) *Subject Headings:* **1. Percolaion through snow 2. Snow morphology 3. Terminology 4. Ripe snow.**—*M.R.*

8.5–281 551.578.7(436)

Nidetzky, Leo (*Montanistische Hochschule, Leoben*), **Schwerer Hagelschlag.** [Severe ailstorm.] *Wetter und Leben*, Vienna, 7(5/6):126–127, **1955. DLC, DWB**—The author lescribes a hailstorm that occurred on July 20, 1955 at Leoben. It began at 17:20 and ended t 17:27. The streets were covered with an ice layer several centimeters in depth. The argest hail stones attained a diameter of 7.5 cm. The extent of the damage is described. *Subject Headings:* **1. Hailstorms 2. Hailstone size 3. Leoben, Austria.**—*I.L.D.*

## HYDROMETEOROLOGY

*See also:* **Met., hydrol. and hydromet.** (Leĭvikov), 8.5–9; **Symposium-Future of arid lands** (White), 8.5–63; **25 yr. of Moscow Hydromet. Tech. School** (Ivanov), 8.5–70; **Precip. and run-off, Jordan** (Goldschmidt), 8.5–137; **Integrator of excess rainfall** (Learmonth), 8.5–139; **Erosion, Tunisia** (Berkaloff, others), 8.5–259; **Kansas City flood, July 13, 1951** (Landers, White), 8.5–265; **Storm, July 18–19, 1952, Rockford, Ill.** (Larson, others), 8.5–266; **Rain-on-snow flood** (Miller), 8.5–268; special bibliography on **Hydrologic Forecasting**, p. 657.

8.5–282 551.579.4

Murray, William E. (*U. S. Forest Service, Ogden, Utah*), **Some upstream aspects of the 952 spring floods in Utah.** *Western Snow Conference, Salt Lake City, April 1954, Proceedings,*

p. 48–54, pub. **1954.** 4 tables. **DWB**—Damaging spring floods were exceptionally wid spread in Utah in 1952. Recorded streamflow for 14 selected streams in northern Utah a peak for previous year and maximum on record, show records were broken at over half of t places. Floods did not come without warning as there was an unusually heavy snow pack mountains—snow data given for 32 mountain stations show 200 to 1000% of normal sn cover on April 1. March and April were very cold—until April 23 when a sudden warmi brought on the flood threat. Snow line was abnormally low (5000 to 6000 ft) in late April a receded to 7000–8000 ft in 2 weeks. Very little flooding resulted from high elevation meltin A comparison of actual and forecast flow for water year and irrigation season show fairly go agreement at many places. Damage was severe to roads, culverts and lowlands. Recurren would be about once in 100 years for a flood of this magnitude. *Subject Headings:* **1. Spri floods 2. Snow melt floods 3. Utah.**—*M.R.*

8.5–283 551.579

§Ozorai, Zoltán, **Adatok a Duna 1956. márciusi árvizének meteorológiai hátteréhez.** [Da on the meteorological background of the Danube flood of March 1956.] *Időjárás*, Budapes 60(2):116–119, March/April **1956.** 4 figs. **DLC**—A long period of severe cold in Hunga gave way on Feb. 28, 1956 to mild weather which lasted until March 7 and became one of t causes of floods involving water levels unequalled for 200 yrs on the Danube between Dun földvár and Mohács (central Hungary). The synoptic development is described. Synopt charts of Europe for Feb. 23–27 (last days of cold period) and Feb. 28–March 7 (warm period temperature curves for Feb. 22–March 8 and aerological time sections for Prague, Budape and Bucharest (Feb. 26–March 8) are presented. *Subject Headings:* **1. Floods, Danube (195 2. Record floods 3. Snow melt floods 4. Hungary.**—*G.T.*

8.5–284 551.579

Pardé, Maurice, **Étude remarquable d'une averse extraordinaire et des crues consécutive par les ingeniéurs américains.** [Unusual study by American engineers of an extraordina deluge and of successive floods.] Separated sheets from unidentified source, [**1953?**] 53–67. fig., photos, refs. Also, bound in his: **Nouvelles données sur la crue de 15 Aout 19 dans le Devon.** [New data on the Aug. 15, 1950 flood on the Devon.] *Annales de Géographi* Paris, 63:219–222, **1954.** 4 refs. Also his: **Études americaines sur les inondations.** [Amer can studies on floods.] *Ibid.*, 64(344):297–299, July/Aug. **1955. DLC**—Discussion, wit data shown on charts, of great flood of July 1942 in Pennsylvania and vicinity, of the meteor logical events and the human and geomorphological consequences. An elaborate questio naire was sent by M. J. E. STEWART to local inhabitants of flooded areas to determine amou of rainfall before the flood, and other meteorological conditions, from depth of water in can etc. Results were used in making the detailed isohyetal chart presented. Third article is brief review of work of U. S. W. B. in the line of flood studies. *Subject Headings:* **1. Floo studies 2. Floods, Pennsylvania (July 1942) 3. Isohyetal charts 4. Pennsylvania 5. Unite States.**—*M.R.*

8.5–285 551.579.5:628(677) 551.582.2(67

Ahrens, Thomas P. (*Geologist, U. S. Bur. Reclamation*), **A reconnaissance ground-wate survey of Somalia, East Africa.** Report of an E.R.P. Technical Assistance Mission under th auspices of the Italian Government. (Comitato Interministeriale per la Ricostruzione Rome, Nov. **1951.** 244 p. 6 tables, 2 charts, 6 figs., 24 plates, 4 maps, 6 refs. **DWB**—Th descriptive survey of ground water conditions and surface hydrology includes also a sho description of the climate, suggesting the appointment of an experienced "rain making organization. Data include: monthly and annual means on the basis of a few years only fo precipitation, temperature, relative humidity, wind direction and speed. Tables are presente also for the yield of principal crops. *Subject Headings:* **1. Water resources 2. Climatic dat 3. Italian Somaliland.**—*A.A.*

8.5–286 551.579.

Hall, W. A., **Permeability and infiltration relationships in one dimensional infiltration in uniform soil.** *American Geophysical Union, Transactions*, 37(5):602–604, Oct. **1956.** fig

3 refs., 7 eqs. **DWB, DLC**—Equations are developed for the relationship between infiltration rate and time for one dimensional flow in a uniform soil of constant permeability. The depth of ponded water, the permeability of the soil and the moisture deficit in the transmission zone are the principal parameters. The equations are compared with experimental data with reasonably satisfactory results in view of the restrictive hypotheses. *Subject Heading:* **1. Soil permeability.**—*Author's abstract.*

8.5–287 551.579.5

Johnson, H. P. and Howe, J. W., **Infiltration frequency on Ralston Creek Watershed.** *American Geophysical Union, Transactions*, 37(5):593–594, Oct. **1956.** 2 figs., 3 refs. **DWB, DLC**—The frequency of occurrence of infiltration rates as indicated by an infiltration index was computed from the records of the Ralston Creek watershed near Iowa City, Iowa. *Subject Headings:* **1. Infiltration index 2. Iowa City, Iowa.**—*Authors' abstract.*

8.5–288 551.579.5

*Kusakabe, M., **On the soil moisture observation at Owada, Pt. 1.** *Japan. Central Meteorological Observatory, Tokyo, Memoirs of Industrial Meteorology*, 18(2):87–102, March **1955.** 5 figs., 6 tables. In Japanese; English summary p. 101–102. **DLC**—Soil sampling and moisture measuring devices are described, physical properties of soils are tabulated, moisture measurements in samples, horizontal distribution of soil moisture at earth's surface in dry, wet and saturated soil, monthly values of soil moisture at surface, 5, 10, 20, 50 and 100 cm, frequency distribution of soil moisture for various weather types and correlation between soil moisture at different depths (sfc to 5 cm, 5 to 10 and 10 to 20 cm) during each month are given in tables and graphs. *Subject Headings:* **1. Soil moisture data 2. Soil-moisture relationships 3. Owada, Japan.**—*M.R.*

8.5–289 551.579.5:551.509.58:551.579.4

Laurenson, E. M. (*Engineering Assistant, Water Supply Investigation Section, Water Supply and Sewage Branch, Dept. of Public Works, N.S.W.*), **The derivation of infiltration indices under Australian conditions.** *Institution of Engineers [of] Australia, Sydney, Journal*, 26(10/11):225–230, Oct./Nov. **1954.** 5 figs., 2 tables, 3 refs. **DLC**—This paper describes the theory and practice of infiltration indices as applied in flood estimation. It is pointed out that infiltration indices are preferable to run-off coefficients as run-off is a residual, rather than a fraction, of rainfall. Factors affecting rate of infiltration are reviewed. Basic principles underlying the derivation of infiltration indices are discussed, and an example is given of such a derivation. *Subject Headings:* **1. Infiltration index 2. Flood forecasting.**—*Author's abstract.*

8.5–290 551.579.5:631.43 551.573

Philip, J. R. (*Research Officer, C.S.I.R.O. Regional Pastoral Lab., Deniliquin, N.S.W.*), **Some recent advances in hydrologic physics.** *Institution of Engineers (of) Australia, Sydney, Journal*, 26(10/11):255–259, Oct./Nov. **1954.** 11 figs., 10 refs., 8 eqs. **DLC**—The relationship of "hydrologic physics" to engineering hydrology is discussed, and its importance in its own right indicated. Two soil properties basic to the study of soil water movement are discussed—"negative pressure" and "unsaturated permeability." An approach to the solution of many hydrologic problems involving soil water movement is outlined and applied to an infiltration problem. FERGUSON's approach to the estimation of evaporation from water surfaces using meteorological data is described, and it is demonstrated that net radiation received, wind speed, saturation deficit and air temperature, are all important. Evaporation from soil surfaces involves both vapour transfer in the atmosphere and soil water movement. These two processes can be treated as a continuous physical system. Results of some preliminary investigations of this system are given. *Subject Headings:* **1. Soil moisture physics 2. Evaporation theory.**—*Author's abstract.*

8.5–291 631.67:551.579.5

Van't Woudt, Bessel D., **Observations on the efficiency of sub-irrigation in heavy soils.** *American Geophysical Union, Transactions*, 37(5):588–592, Oct. **1956.** fig., 5 tables, 7 refs. **DWB, DLC**—The interest in sub-irrigation has lately been revived because of its successful

application in a number of sandy soils, peats, and some heavy soils in the Netherlands. In heavy soils the difficulty is encountered that water extraction by roots tends to exceed moisture replenishment from a water table. This is related to the slow capillary movement in heavy soils and to the fact that the rate of this movement declines progressively as the soil-moisture content is further depleted by the roots. The rate can be maintained where the soil is kept moist by occasional rain storms during the period of sub-irrigation. This point is illustrated by experimental work at Rukuhia. Measurement of pasture production at various depths of water table and under varying climatic conditions showed that sub-irrigarion can be quite successful if supplemented by rain; in the absence of rain sub-irrigation was quite inefficient. Some observations have been referred to which show that substantial amounts of water can be derived from a water table, even in heavy soils, where active roots penetrate close to it, but an undue rise in the level of the water table should be averted in that case. *Subject Headings:* **1. Irrigation efficiency 2. Soil permeability.**—*Author's abstract.*

# CLIMATOLOGY AND BIOCLIMATOLOGY

## CLIMATOLOGY

*See also:* **Climatological services** (Bacsó), 8.5–49; **Climatological services** (Boughner), 8.5–50; **Snowfall estimates** (Galway), 8.5–275.

8.5–292 551.581(68) 551.585.53(68)

Debenham, Frank, **The geography of deserts.** (In: Institute of Biology, London, **Biology of deserts.** London, **1954.** p. 1–6.) **DWB**—The general atmospheric and oceanographic factors giving rise to hot deserts and the specific role of atmospheric moisture in the formation of deserts and the role of rain shadow effect in the formation of the Kalahari and other deserts are summarized and a more detailed account of the moisture cycle in deserts is presented. The formation of convective rain in deserts, the effect of dark bare soil on thunderstorm and rainfall incidence in the Kalahari, rainfall infiltration into desert soil, etc. are discussed. *Subject Headings:* **1. Desert climatology 2. Desert soil moisture 3. Kalahari, Union of South Africa.**—*I.L.D.*

## CLIMATE OF PARTICULAR PLACES

*See also:* **Dynamic North** (U. S. Off. of Naval Operations), 8.5–4; **Greenland** (Ignat'ev), 8.5 13; **Climate, Bri. Columbia and the Yukon** (Kendrew, Kerr), 8.5–23; **Met., Arctic** (Petterssen et al.), 8.5–31; **World climatic atlas** (Ashford), 8.5–48; **U. S. Navy Marine Climatic Atlas** (U. S. Off. Naval Operations), 8.5–81; **Groundwater survey of Somalia** (Ahrens), 8.5–285.

8.5–293 380.8:551.582(72)

Gerstenhauer, Armin, **Acapulco, die Riviera Mexikos.** [Acapulco, Mexico's Riviera.] *Die Erde*, (No. 3/4):270–281, **1956.** 4 figs., 19 refs. **DLC**—The number of tourists, especially Americans, visiting Mexico has greatly increased since 1929, and Acapulco (16.9°N, 99.9°W) has become the main tourist center. The town and surroundings are described and the climate summarized, with curves of temperature, relative humidity and rainfall. The rainy season is June–Sept. *Subject Headings:* **1. Tourist traffic 2. Climate of Acapulco, Mexico 3. Acapulco, Mexico.**—*C.E.P.B.*

8.5–294 551.582.2(57)

*Japan. Hydrographic Dept., **Soren-Kyokuto, Manshu, Karafuto Oyobi Chishima no Kisho.** [Weather of Eastern Siberia, Manchuria, Sakhalin and Kurile Islands.] October **1939.** 193 p. numerous charts (many fold.). **DLC**—Extensive tables of data for about 100 stations in East Asia, North of Vladivostok and east of Lake Baikal and as far north as the Arctic Circle. The second half of the volume is devoted entirely to charts with isohyets, isotherms, and frequencies of winds, days with weather conditions, etc. Records used extend

rom 1915 or 1920 to 1934 or 1935 at the latest. Comprehensive summaries of conditions in 3 areas are included, with illustrations and tabular material. *Subject Headings:* **1. Climate of ast Siberia 2. Sakhalin 3. Kuriles 4. Manchuria 5. East Siberia.**—*M.R.*

8.5–295 551.582.2(47) 551.586:615.834

*Kellerman, V. V., **Klimat Gosudarstvennogo kurorta Saki.** [Climate of the Saki State lealth Resort.] (In: **Saki-Kurort.** Simferopol, Gos. Izd-vo Krym ASSR, **1935**–. Vol. 1, . 117–173. 3 figs., numerous tables.) **DLC**—Analysis of 07, 13 and 21h data for pressure 1924–33) temperature (1916–33), frost, wind direction and speed, gales, land and sea breezes, elative humidity, cloudiness, precipitation, snow cover, hydrometeors, sunshine, clear and loudy days, and effective temperature at Saki, one of the oldest health resorts in Russia ating back to ca. 1820, located on a salt lagoon just off the Black Sea in the Crimea. The ata are presented in the form of frequency tables and diagrams for each of the 3 observation ours. On p. 435–473 the article by S. A. Pastak, entitled **Rapnoe khozaïstvo Sakskogo urorta** (Salt industry of the Saki Resort) contains an analysis of and table and graphs of data n precipitation, evaporation and hydrologic balance for each month from 1926–33, as well s salt balance on Saki Lake. *Subject Headings:* **1. Climate of Saki, Crimea 2. Hydrologic alance 3. Balneology 4. Saki, Crimea.**—*M.R.*

8.5–296 551.582.2(45)

*Polli, Silvio, **Dati climatici di Grado.** [Climatological data for Grado.] *Trieste. Istituto Sperimentale Talassografico, Pubblicazioni*, No. 311, **1954.** 4 p. tables. **DWB**—Mean nd extreme monthly pressure, temperature, precipitation, relative humidity, cloudiness and ea temperature for 10 years (1932–1941), and for 1953 are tabulated and discussed for Grado, taly (an island NW Gulf of Trieste) located in a park 120 m from the seashore, at lat. 45° 1′36″N, long. 13°23′48″E, 1.6 m height. Evaporation and hours of sunshine are given for 953 only. Wind records did not begin until Jan. 1, 1954 and are not included. *Subject leadings:* **1. Climatic data for Grado, Italy 2. Grado, Italy.**—*M.R.*

## CLIMATIC CHANGES

*See also:* **Glacier variations, Arctic** (Sharp), 8.5–32; **Climatic change** (Arakawa), 8.5–147.

8.5–297 551.583.13

Berkes, Zoltán, **A Brückner-periodus jelentkezése őszi-téli csapadékunkban.** [Brückner ycle in Hungary's fall-winter precipitation.] *Időjárás*, Budapest, 58(5):320–321, Sept./Oct. **954.** fig. **DWB**—The existence of the Brückner cycle, a 36-year periodicity, is demonstrated n fall and winter precipitation data for Budapest and Debrecen (1842–1953). The mean mplitude of the periodicity is found to be 128 mm, almost half of the median value. Similar eriodicities were found earlier in temperature data. *Subject Headings:* **1. Brückner's cycle . Precipitation periodicities 3. Long period records 4. Hungary.**—*G.T.*

8.5–298 551.583.3

Van Burkalow, Anastasia, **Meandering valleys and climatic change.** *Geographical Review*, . Y., 45(3):430–431, July **1955.** refs. in text. **DWB, DLC**—The author discusses **Contributions to a general theory of meandering valleys** by S. H. Dury (*Am. Journ. of Science*, 52:193–224, **1934**). It is shown that underfit streams are found in such a variety of regions hat their existence is explicable not by hypothesis of lithologic or structural control but by ssuming that "the valley meanders formed during glacial times when there was not only a reater total rainfall but, because of the compression of storm tracks, a greater intensity of ainfall, and consequently, a great increase in runoff." *Subject Headings:* **1. Climatic changes . Underground rivers. I. Dury, S. H.**—*I.L.D.*

8.5–299 551.583.13

Sakata, K., **A new classification of season, Pt. 2.** *Journal of Meteorological Research*, okyo, 4(11):903–911, Feb. **1953.** 6 tables, 9 refs. In Japanese; English summary p. 56. **WB, DLC**—The year in Chugoku region is divided into ten seasons and normal values of the

meteorological elements are given for each. *Subject Headings:* **1. Seasonal variations 2. Japan.**—*C.E.P.B.*

8.5–300 551.583.1

Khromov, S. P., **Kolebaniia klimata i sovremennoe poteplenie.** [Climatic variations and contemporary warming up.] *Priroda*, Moscow, 45(1):24–34, Jan. **1956.** 4 figs. **DLC**—The author reviews the evidence in the gradually warming up of climate, in particular the rise in mean annual and winter temperatures during the past 50 years, and discusses the possible causes of this climatic change such as changes in the character of the general circulation as experienced in the drop of atmospheric pressure during winter in northern latitudes (observed by Scherhag) and periodic variations in solar activity. *Subject Heading:* **1. Climatic trends**—*I.L.D.*

## MICROCLIMATOLOGY

*See also:* **Threshold value of $CO_2$ in air at a beet leaf surface** (Reinau), 8.5–114.

8.5–301 551.584.4

Tranquillini, Walter, **Über den Einfluss von Übertemperaturen der Blätter bei Daueinschluss in Küvetten auf die ökologische $CO_2$-Assimilationsmessung.** [Effect of excess temperature of leaves enclosed in containers upon ecological $CO_2$ assimilation measurement.] *Deutsche Botanische Gesellschaft, Berlin, Berichte*, 67(6/7):191–204, Aug. 31 **1954.** 6 figs., table, 10 refs. **DLC, DA**—Comparative data on leaf temperatures on free and enclosed plants are presented. The values were obtained under the extreme radiative conditions of a mountain area (Obergurgel, elev. 2000 m, Sept.–Oct. 1953). Differences up to 25.4°C were found between leaf temperature in and outside the chambers. Data of $CO_2$ assimilation obtained in chambers under such circumstances may not be used for exemplifying conditions in the open. The use of infrared absorbent glass and air circulation at 0.5 cm/sec was found to reduce the excess heat appreciably. *Subject Headings:* **1. Leaf temperature 2. Carbon dioxide assimilation measurement.**—*G.T.*

8.5–302 551.584.61:551.573:628.8

Bacon, R. A., **Effect of evaporative roof cooling on room temperature of a house.** (In Mid-Southwest Conference on Tropical Housing and Building, Austin, Texas, April 195[illegible] **Proceedings,** p. 76–84, Austin, [1952?] 3 figs.) **DWB**—The use of a sprinkling system on house roofs to cool room temperature is discussed. The sprinkling system installed in an experimental house, the operation of the system and the degree of efficiency in reducing roof temperatures are described. *Subject Headings:* **1. Evaporative cooling 2. Cooling of house 3. Room temperatures.**—*I.L.D.*

8.5–303 551.584.61:631.

Uehara, M. and Isozaki, Yoshimasa (*Kagawa Agri. Coll.*), **On the micrometeorology in the hot-cap, Pt. 1.** *Journal of Agricultural Meteorology*, Tokyo, 8(12):4–6, March **1953.** 2 figs. 3 tables. In Japanese; English summary p. 6. **DWB**—In order to show the effect of hot caps comparisons in pyrheliometric values, maximum and minimum air temperatures, ground temperatures and evaporation values in and out of each cap, made of vinyl chloride film, are given quantitatively. *Subject Headings:* **1. Cover influences 2. Microclimates.**—*H. Arakawa*

8.5–304 551.584.9:64

Kudo, T., **Weather and clothing.** *Sendai, Japan. Central Meteorological Observatory Bulletin of the Meteorological Society of Tohoku District*, 6(1):67–74, Nov. **1951.** 10 figs. 2 tables. In Japanese; English summary p. 252. **DWB**—This is a study on the relation between meteorological elements and clothing or "kotatsu" in the agricultural district of Iwate Prefecture in winter. It is found that the variance of number of garments worn is greater inland than near the coast and greater in the south than the north. It is also great on mountain peaks and small on slopes. The number of garments depends only upon sensible temperature. Garments are added at the rate of one for each 10°C decrease of sensible

temperature. From the frequency distribution of temperature at the beginning and ending of period when kotatsu is used it is found that the critical temperature is 16°C. In southern and coastal areas it is used early, in the northern and mountain areas late. This fact verifies the causes of fire for this area inasmuch as fires are usually a result of accidents with kotatsu in the north and of kitchen fire in the southern part of the prefecture, as found by K. Kurashige, director of Morioka weather station. *Subject Headings:* **1. Clothing climate 2. Clothing requirements 3. Iwate Prefecture, Japan.**—*Author's abstract.*

## CLIMATIC CLASSIFICATION

*See also:* **Agromet. problems** (Molga), 8.5–112; **Mean geogr. vertical gradients of air temp.** (Lautensach, Bögel), **8.5–221**; **Geogr. of deserts** (Debenham), 8.5–292.

8.5–305 551.585

Azzi, G., **Le concept du climat absolu et la classification des climats.** [Concept of absolute climate, and climatic classification.] *La Météorologie*, Paris, No. 38:161–166, April/June **1955.** tables. English and Spanish summaries p. 161. **DWB**—Criteria of absolute climate are determined on the basis of average temperature and precipitation for the entire globe. This rigid approach to climatic classification allows for the establishment of only four general climatic types (which nevertheless can serve as a foundation for more refined classification schemes), namely 1) warm-dry, 2) cold-dry, 3) warm-humid and 4) cold-humid climates It is calculated that 42% of the earth's surface has below-average and 58% above-average temperature, while 56.64% has below-average and 43.36% above-average precipitation, the average global temperature being 13.7°C and the average annual precipitation 1229 mm. *Subject Heading:* **1. Climatic classifications.**—*G.T.*

8.5–306 551.585

*Kirikov, S. V., **Ptitsy i mlekopitaiushchie iuzhnoĭ okrainy Priural'ia.** [Birds and mammals of the southern margin of the Urals.] *Akademiia Nauk SSSR. Institut Geofrafii, Trudy*, No. 66:5–107, **1955.** 19 figs., 21 tables, bibliog. p. 104–107. **DLC**—The southern Urals is divided into three natural physiographic regions, namely: the foothills of the Festuca-Stipa and stone steppe, the foothills of the Stipa-mixed grass and stone steppe and the forest steppe foothills. The climatic characteristics of each of these regions is described with the aid of climatic data which include the representative stations in each region, mean monthly temperature and precipitation, minimum air temperature during the winter months and maximum air temperature during the summer months. *Subject Headings:* **1. Climatic regions 2. Steppe climates 3. Ural Mountains, U.S.S.R.**—*I.L.D.*

8.5–307 551.585.5:631.58:628.13

Feio, Mariano (*Centro de Estudos Geog., Univ. de Lisboa*), **Perspectivas da açudagem no Nordeste Sêco.** [Possibilities of use of reservoirs in the dry northeast.] *Revista Brasileira de Geografia*, Rio de Janeiro, 16(2):213–227, April/June **1954.** tables, refs. French, Portuguese, English, German and Esperanto summaries p. 225–227. **DWB, DLC**—Climatic conditions which cause drought and influence living conditions in the northeastern part of Brazil, public and private reservoir construction which can only play a minor role in relieving drought conditions (through irrigation), and the possibility of using water conserving plants, deviating water courses so as to flood the plains, contour plowing, strip farming, terracing, etc. are discussed. A few quantitative data are presented concerning the amount of irrigation, reservoir storage, etc. at present and possible to develop. *Subject Headings:* **1. Water conservation 2. Arid zone agriculture 3. Northeast Brazil.**—*M.R.*

8.5–308 551.585.5

Langlo, K., **Increased efforts to develop the arid lands.** *World Meteorological Organization, WMO Bulletin*, 5(1):21–23, Jan. **1956.** photo. **DWB**—Budget of UNESCO Arid Zone Committee for 1957/8 equals that of WMO. A symposium on arid zone climatology with emphasis on microclimatology will be held in Canberra, Australia, in Oct. 1956. The number

of participants will be limited to 65. Recommended agenda for the 10 sessions is outlined. Climatic maps of middle east illustrating water balance of region, drawn under the direction of C. W. THORNTHWAITE were recommended for publication. *Subject Headings:* **1. Arid zone climatology 2. Canberra, Australia.**—*M.R.*

8.5–309 551.585.5

Woodbury, Angus M. (*Utah Univ., Salt Lake City*), **Science, population, and arid lands.** *Science*, Wash., D. C., 122(3161):200–201, July 29, **1955. DLC, DWB**—The steady increase of the world's population which has again doubled, from 1200 to 2400 million from 1850 to 1950, pushes people into marginal, less densely populated arid areas occupying 32% of the earth's surface and 14% of the Americas. [Arid Lands Meeting in New Mexico, April 1955.] The cause of aridity lies in the prevailing wind patterns and rain shadows caused by mountains. Much of the land is doomed unless additional water supply can be provided. One such arid region lies in the U. S. It is composed of the Great Basin, the Colorado River system drainage and the Rio Grande drainage areas. The streams of the region do not provide enough water. Additional sources might lie in the Columbia River basin, the ocean and perhaps intheMississipi River Basin. Technology is not advanced enough to use the ocean. Techniques are available for obtaining water from the Columbia and Mississippi rivers but costs are too great. The author suggests development of the upper Colorado River for use of part of its waters in the interior states of Utah, Wyoming, Colorado and New Mexico, now before Congress, which is being bogged down by diversionary political tactics beclouding the issue. *Subject Headings:* **1. Arid zones 2. Water resources 3. Western United States.**—*A.M.P.*

8.5–310 551.585.53:551.577.2

Monod, Th., **Modes 'contracté' et 'diffus' de la végétation saharienne.** ['Restricted' and 'diffuse' types of Saharan vegetation.] (In: Institute of Biology, London, **Biology of deserts.** London, **1954.** p. 35–44. 3 figs., table, 6 refs.) **DWB**—The influence of precipitation, both rain and dew upon the diffuse or restricted type of vegetation of the Sahara is considered. The limit between the two tends approximately towards the isohyets 30–50 mm (often between 50 and 100 mm at the Saharan border). An isohyetal map of the total mean annual rainfall in mm is presented. *Subject Headings:* **1. Isohyetal charts 2. Desert vegetation 3. Sahara Desert.**—*I.L.D.*

## BIOCLIMATOLOGY

*See also:* **Bioclimatic Conference at Inowroclaw,** 8.5–122; **Climatic tolerance** (Vowinckel), 8.5–123; **Climate of Saki, Crimea** (Kellerman), 8.5–295.

8.5–311 551.586:581.056

Hammer, K. C., **The influence of climatic factors on mineral and vitamin content of plants.** (In: Specialist Conference on Plant and Animal Nutrition in Relation to Soil and Climatic Factors, Australia, 1949, **Proceedings,** p. 220–225, pub. **1951.** refs.) **DWB**—A critical review of the literature dealing with the influence of climatic variables upon the mineral and vitamin content of plants. Climate has nearly the same influence upon mineral content of sugar cane as does soil and exerts a greater influence upon the phosphorus and potassium content of grain than does soil. Temperature and light influence nitrate metabolism of pineapples, which increases at higher temperature and during greater length of day; climate determines the ascorbic acid content of vegetables. Suggestions are presented for investigating the specific relationships between climate and mineral and vitamin content of plants. *Subject Headings:* **1. Climatic influences 2. Vitamin content of plants 3. Mineral content of plants.** —*I.L.D.*

8.5–312 551.586:591.16:595.75

Palat, Karl, **Bioklimatische Gesetzmässigkeiten in der Paarungsbiologie der flügellosen Feuerwanze (*Pyrrhocoris apterus*).** [Bioclimatic laws in the mating of the wingless red bug (*Pyrrhocoris apterus*).] *Wetter und Leben*, Vienna, 7(3/4):67–75, **1955.** 5 tables, 17 refs. **DLC**—The behavior of the red bug was correlated with climatic observations made at the

Hohe Warte, Vienna. The investigation includes: temperature of winter quarters and reactions before mating, the relationship between sunshine duration, mean daily air and soil temperature, precipitation and mean daily relative humidity and mating behavior, and the relationship between temperature and sunshine conditions and egg deposition and care. *Subject Headings:* **1. Bioclimatology 2. Insect mating.**—*I.L.D.*

8.5–313 551.586:615.8

Mörikofer, W., **Die Klimakurorte der Schweizer Alpen.** [Climatic health resorts of the Swiss Alps.] Reprint from: *Schweizer Journal*, Aug. **1953.** unpaged. **DWB**—The author discusses the particular topographic characteristics of Switzerland which favor the presence of health resorts, the elevations most suitable for health resorts, the characteristics of global and ultraviolet radiation at different elevations, the stimulating and relaxing effect of various climatic zones, and the physiological mechanisms involved in climatic therapy. *Subject Headings:* **1. Health resorts 2. Climatotherapy 3. Swiss Alps.**—*I.L.D.*

8.5–314 551.586:631

Schmidt, Werner, **Wärmeklima und Ökotypus.** [Heat climate and vegetation types.] *Deutsche Botanische Gesellschaft, Berlin, Berichte*, 66(2):101–113, March **1953.** 5 figs., 4 tables, 21 refs. **DLC**—The ecological significance of the 5°C threshold value in temperature summation and the variation of the 5°C line in continental and maritime Europe are discussed. The author then compares the lengths of the vegetation period (5°C line) with the vegetation duration of local populations of plants which have developed through natural selections within the species. In the tree species investigated the following characteristics correspond to the warmth climate of their origin: 1) the best optimum during germination; 2) beginning and end of growth; 3) amount of dry matter in winter; 4) photoperiodic reaction; 5) phototropic reaction and 6) branching. *Subject Headings:* **1. Plant ecology 2. Phenology.**—*I.L.D.*

8.5–315 551.586:636.4

Bond, T. E.; Kelly, C. F. and Heitman, Hubert, Jr., **Heat and moisture loss from swine.** *Agricultural Engineering*, 33(3):148–152, March **1952.** 9 figs., 10 refs. **DLC**—A cooperative study, conducted by the U. S. Dept. of Agriculture and the Univ. of California at Davis, is reported. A psychrometric chamber equipped with air conditioning and thermocouple recording apparatus was used for determining under varying sensible temperature conditions the heat loss from swine belonging to various weight groups. Results of the experiments are graphically represented and discussed. The apparatus used is described and shown in photographs. *Subject Headings:* **1. Animal climatology 2. Pigs.**—*G.T.*

## ENVIRONMENTAL INFLUENCES

*See also:* **Weather on Mt. Kredarica** (Manohin), 8.5–56; **Symposium-future of arid lands** (White), 8.5–63; **24-hour component of diurnal pressure oscillation** (Pyle), 8.5–226; **Snowfall estimates** (Galway), 8.5–275.

8.5–316 551.588.6:551.311:631.4(81)

Maack, Reinhard, **Über Waldverwüstung und Bodenerosion im Staate Paraná.** [On forest destruction and soil erosion in Parana.] *Die Erde*, No. 3/4:191–228, **1956.** 4 figs., 28 photos, 4 tables, 15 refs. **DLC**—A few decades ago 177,395 out of 201,227 km² of Parana were tropical-subtropical rain forest, becoming Araucaria forest in the higher subtropics. Since then nearly half the primeval forest has been destroyed by fire and cropping. Plant distribution is shown in 1937, 1948 and 1955. Köppen's climatic types are mapped and the changes in consequence of deforestation described. The climate has become more extreme, especially in the uplands, with catastrophic winter droughts, torrential rains, extremes of temperature, more frequent frosts, disturbance of the normal water circulation and continuous soil erosion by water and wind. There has been great damage to coffee plantations and even the uncut forest has suffered. Many photos show the damage. *Subject Headings:* **1. Deforestation 2. Soil erosion 3. Parana, Brazil.**—*C.E.P.B.*

## SYNOPTIC CLIMATOLOGY

*See:* **Studies in synoptic climatology** (Sellers), 8.5–1; **Ceiling-visibility-wind relationships** (Peterson), 8.5–106.

# MISCELLANEOUS

## SOLAR INFLUENCES

*See also:* **Symposium-geomag. activity and solar-terrestrial relationships,** 8.5–62; **Oblique transmission by Meteoric E-layer** (Naismith), 8.5–182; **Ionospheric observations during solar eclipse** (Saha, others), 8.5–183.

8.5–317 551.590.21:551.594.18:523.75

Veldkamp, J. and Scholte, J. G. (*Roy. Netherlands Met. Inst., De Bilt*), **Some remarks on the equatorial electrojet, as revealed by the analysis of solar flare effects.** *Indian Journal of Meteorology and Geophysics*, Delhi, vol. 5, Spec. No.: 203–212, Dec. **1954.** 5 figs., 11 refs., 4 eqs. **DWB**—Maps are reproduced of the current vectors of three strong solar flare effects, viz. 1953 Oct. 14d 09h 50m, 1953 Oct. 14d 14h 23m and 1950 Feb. 13d 19h 23m. The well-known electrojet over South America is revealed by large currents at the stations Hu and Va. No such large currents are observed at Bi and MB in equatorial Africa. BAKER and MARTYN have extended the atmospheric dynamo theory of the diurnal variation by taking the Hall effect into account, and have succeeded in explaining the equatorial anomaly. As these authors assumed a coincidence of the geomagnetic and geographic equators, this theory is unable to provide an explanation of the different values of the anomaly at different points of the equatorial belt. In this paper the current system is calculated for an oblique dipole axis. Large anomalies are found at those points where the equators reach their greatest deviation, whereas in Equatorial Africa the calculated $S_q$ variation is very small; in the Pacific the anomaly must be very pronounced too. More data are needed to check this result. *Subject Headings:* **1. Equatorial electrojet 2. Solar flares 3. Ring currents 4. Equatorial Africa.**—*Author's abstract.*

8.5–318 551.590.25:523.5(57)

Fessenkov, V. G. (*Academy of Sciences, Moscow*), **Sikhoté-Aline meteorite.** (In: Kaiser, T. R. ed., **Meteors.** London, Pergamon Press, **1955.** p. 179–183. 12 figs. (includ. photos), table, 10 refs.) **DWB**—The 100 tons of meteoritic matter which fell near 134°39′.2E and 46°9′.6N at 1038h (0038Z) on Feb. 12, 1947, provided the best opportunity for scientific study of conditions attending a major meteor fall. The ball was brighter than sun, and light and sound phenomena were noted over an area at least 300–400 km in radius. No noticeable seismic effects occurred at Vladivostok, 500 km distant. A dark turbulent tail with strong absorption of short wave radiation was left behind (see fig. 2). Places where specimens and craters were found in Taiga Forest by the 4 expeditions of the Academy of Sciences, are shown on chart of 1×2 mile area. Initial mass of meteorite is estimated at several hundred tons and speed 500–600 m/sec with initial speed 14–15 km/s. (For original report by author, *see* J–101 Oct. 1950, *MAB.*) *Subject Headings:* **1. Sikhote-Alinsk meteorite (1947) 2. Meteor explosions Sikhote-Alin Region, Asiatic U.S.S.R. 3. Sikhote-Alin Region, Asiatic U.S.S.R.**—*M.R.*

8.5–319 551.590.25

Katassev, L. A. (*Stalinabad Astronomical Observatory, Tadjikistan, U.S.S.R.*), **Meteor investigations at the Stalinabad Astronomical Observatory.** (In: Kaiser, T. R., ed., **Meteors** London, Pergamon Press, **1955.** p. 193–194. fig., 7 refs., eq.) **DWB**—Meteor investigations were begun at Stalinabad Astronomical Observatory in 1933 and photographic studies of meteors in 1938. Prevailing winds at <80 km are east, and >80 km west with mean velocity of 50–100 m/sec and with turbulence evident in all cases. Coefficient of diffusion D involving turbulence of air is introduced into calculations rather than velocity of diffusion. Theory of motion, loss of mass (90%), explosive wave vs. shock wave observed for higher velocity meteors like Perseids or Leonids, automatic meteor patrol planned for Stalinabad, and other phases

f work are reported. *Subject Headings:* **1. Meteor research in U.S.S.R. 2. Stalinabad stronomical Observatory 3. Stalinabad, Tadjik S.S.R.**—*M.R.*

8.5–320 551.590.25:551.577.32

Levert, C., **On the possible influence of meteoritic dust on rainfall.** *Geofisica Pura e pplicata*, Milan, 33:273–277, **1956.** 6 refs., numerous eqs. **DLC**—This article comments n the statistical aspects of the calculations in BOWEN's article on the influence of meteoritic ust on rainfall. BOWEN seems to have neglected the phenomenon of self correlation in the eries of rainfalls on successive days. This neglect made his conclusions rather significant, ut when the self correlation is considered in the right way many of his results become in-ignificant and the question whether the meteoritic dust has the influence mentioned above emains unanswered. We applied the range and the so called constellation test. Especially tress is laid on the necessity of developing a coincidence test, which furnishes the probability f coinciding of peaks (one peak in one series, one peak in another one) even if the peaks are tatistically unreal and of course the persistence ought to be considered. Three types of uch a test were proposed. We also introduced a new way of tackling the problem stated by BOWEN. Since HANNAN published the numerical values of the serial correlation coefficients or Sydney (the rainstation used by BOWEN) we were able to give a more numerical basis to ur critical remarks. *Subject Headings:* **1. Meteorite influences on rainfall 2. Rainfall ingularities.**—*Author's abstract.*

8.5–321 551.590.25:551.510.535

Neužil, L. (*Astronomical Inst., Ondřejov, Czechoslovakia*), **Meteoric influences on the porадic E-layer.** (In: Kaiser, T. R., ed., **Meteors.** London, Pergamon Press, **1955.** p. 96–08. 4 figs., 2 refs.) **DWB**—Data on critical frequencies of the $E_s$ attained at Freiburg in 947–9 are compiled to show the annual variation. An asymmetry with regard to the summer olstice (both day and night) corresponds with the fact that the great meteor showers occur fter the summer solstice. This relation is shown graphically in several ways. *Subject Headings:* **1. Meteor influence on sporadic E layer ($E_s$) 2. Sporadic E layer ($E_s$)-meteor hower relationships.**—*M.R.*

8.5–322 523.5 551.590.25

Whipple, Fred L. and Hughes, Robert F. (both, *Harvard College Obs.*), **On the velocities nd orbits of meteors, fireballs, and meteorites.** (In: Kaiser, T. R., ed., **Meteors.** London, ergamon Press, **1955.** p. 149–156. 3 figs., 2 tables, 13 refs., eq.) **DWB**—Extra-terrestrial naterial falling upon the earth can be arranged according to mass in the following sequence: adio meteors, visual meteors, photographic meteors, fainter fireballs, great fireballs, detonating olides, and meteorite falls. Precise velocities have been measured only for radio meteors, neteors of cometary streams, and photographic meteors. These velocities and the elongation f the apparent radiants from the apex of the earth's motion indicate that in the sequence eginning with photographic meteors the distribution of geocentric velocities shifts progres-ively towards the low-velocity limit. That is, the orbits become less inclined, smaller, and nore circular. The relative cometary contribution is probably a maximum for the smallest nasses and decreases steadily to zero for meteorite falls. Meteorites move largely in small, ow-eccentricity orbits of small inclination. We find that their root-mean-square atmospheric elocity is about 17 km/sec. *Subject Headings:* **1. Meteor velocities 2. Meteorite velocities 3. Meteor orbits 4. Fire balls.**—*Authors' abstract.*

## VISIBILITY

8.5–323 535.7:551.591.1

Müller-Limmroth, W. (*Physiological Inst. of Westfälische Wilhelms-Univ., Münster i. Westf.*), **Die Theorien des Farbsehens, [Pt. 1–2].** [The theories of color vision.] *Naturwis-enschaften*, Berlin, 43(15 and 16):337–346; 364–370, Aug. 1 and 15, **1956. DWB**—The first part describes the history of color investigation and color vision since Plato. There are occa-sional brief references to colors in meteorology, e.g., rainbow, twilight. The second part describes a number of theories of color vision. The bibliography of nearly 300 items is not

printed but will be sent on application to the author. *Subject Heading;* **1. Color vision.**—*C.E.P.B.*

8.5–324 551.591.1:535.

Sloan, Louise L. and Habel, Adelaide (both, *Johns Hopkins Univ.*), **Recognition of re and green point sources by color-deficient observers.** *Optical Society of America, Philadelphi Journal*, 45(8):599–601, Aug. **1955.** 2 figs., 2 tables, 5 refs. **DWB, DLC**—Determinatio are made of the minimal intensities in mile-candles at which color-deficient observers coul distinguish red and green point sources falling within or just outside the chromaticity limit proposed by JUDD. For colors within these limits the minimal intensities are closely relate to scores on the Air Forces Color Threshold Test. When slightly yellower greens are include the task is more difficult for the color-deficient observer. *Subject Heading:* **1. Color visio** —*Authors' abstract.*

## OPTICAL PHENOMENA

8.5–325 551.593.1:535.31

Kukkamäki, T. J. (*Finnish Geodetic Inst., Helsinki*), **Causes d'erreurs systématiques de nivellements.** [Causes of systematic errors in leveling.] *International Union of Geodes and Geophysics, Brussels, Aug. 1951, Comptes rendus des Travaux de la Section des Nivellement de Précision*, p. 433–436, pub. Paris, **1955.** In English. **DWB**—Errors due to atmospheri refraction are said to depend only on atmospheric conditions and not on direction of leveling Sinking of the leveling plate on the ground would, however, make a systematic error dependin on direction of leveling. *Subject Heading:* **1. Atmospheric refraction errors in leveling.**—*M.K*

8.5–326 551.593.1:535.314:551.524.

Kukkamäki, T. J. (*Finnish Geodetic Inst., Helsinki*), **Effets de la réfraction atmosphériqu sur des nivellements déduits du gradient vertical de la température.** [Effects of atmospheri refraction on leveling deduced from the vertical temperature gradient.] *International Unio of Geodesy and Geophysics, Brussels, Aug. 1951, Comptes rendus des Travaux de la Section de Nivellements de Précision*, p. 429–431, pub. Paris, **1955.** fig., table. In English. **DWB**— Results of numerous levelings in Finland show that 3 hrs after sunrise and 3 hrs before sunse when temperature gradients are near zero, systematic errors occur in leveling along a slope During the night, when inversions occur, great differences occur. A table gives an idea of th magnitude of the refraction (0.033 mm per 1 m. difference in elevation in the mean —as much a +6.7 mm in extreme cases). A resistance thermometer (illus.) is used to determine tem perature gradients along survey rod. *Subject Headings:* **1. Atmospheric refraction errors i leveling 2. Refractive index 3. Vertical temperature gradient 4. Resistance thermometer 5. Finland.**—*M.R.*

8.5–327 551.593.5 535.4

Kuznetsov, E. S. and Ovchinskiĭ, B. V., **Rezul'taty chislennogo resheniia integral'nog uravneniia teorii raseianiia sveta v atmosfere.** [Numerical solution of integral equation o the theory of light scattering in the atmosphere.] *Akademiia Nauk SSSR. Geofizicheskiĭ Institut, Trudy*, No. 4(131), **1949.** 103 p. numerous tables, refs., eqs. **DLC**—This work presents the first part of extensive investigations on the applications of the theory of light scattering in the atmosphere. It contains numerical results of calculations made with various values of physical parameters, several tables serving for calculations, and tables of turbidity coefficients. All tables may serve as basis for calculation by solving various practical and theoretical problems connected with scattering of light in the atmosphere. Numerical methods applied for computation of these tables are explained in text. *Subject Headings:* **1. Scattering of light 2. Integral equations.**—*N. A. Zikeev*

8.5–328 551.593.55

Maier, Wilhelm, **Sonnendoppelschatten und Purpurlicht.** [Double sun shadows and purple light.] *Meteorologische Rundschau*, 9(11/12):206–210, Nov./Dec. **1956.** 5 figs., 5 refs. **DWB**—The color photographs of F. VOLZ showing double shadows are discussed. It is shown

by observations in a tunnel that they must be due to two light sources. Microscopic study of photos with different colored filters show a separation of blue and violet images from red, yellow and green, which is attributed to reflection of blue-violet sunlight by a reflecting layer at 676 km distance. When the sun descends 4° below the horizon the doubly reflected blue-violet rays coincide with the direct red rays and give the first purple light. The second purple light is explained by a first reflection from the sea and a second from a high cloud or plateau. *Subject Headings:* **1. Double shadow of sun 2. Purple light 3. Twilight phenomena.**—*C.E.P.B.*

## ELECTRICAL PHENOMENA

*See also:* **Lightning and thunder** (Stekol'nikov), 8.5–11; **Artificial atmos. radioactivity** (Schumann), 8.5–124; **Met. aspects of atomic radiation** (Wexler), 8.5–126; **Lightning** (Bottomley), 8.5–129; **Short radio waves reflected from ionosphere** (Whitehead), 8.5–187; **Effect of forced water vapor diffusion on growth of small charged droplet** (Kano), 8.5–245; **Equatorial electrojet** (Veldkamp, Scholte), 8.5–317.

8.5–329 551.594

Bent, Arthur E., **Variations in atmospheric electricity at Mount Washington.** *Mt. Washington Observatory, Gorham, N. H., Bulletin*, No. 28:4–8, Dec. **1955.** 4 figs., 2 tables. **DWB**—Ignoring all cases with disturbed weather conditions (charged precipitation) at Mt. Washington, N. H., and Foxboro, Mass., revised curves of diurnal variation in radioactive collector current at the two stations have been calculated and are presented in comparison with original curves published in Aug. 1955 issue of this bulletin. Data for March 1954 through July 1955 give a smoother curve and higher values than shorter record did. No seasonal trend is evident, but a marked diurnal variation is noted. Relation with surface wind speed, shown on scatter diagram, is poor. Relation with 300 mb jet within 50 miles of station was also found to be poor, no matter how it was calculated. Data on radioactive collector current and high speed jets over New England are tabulated and shown on charts for Jan.–June 1955. *Subject Headings:* **1. Atmospheric electricity 2. Jet stream 3. Mt. Washington, N. H.**—*M.R.*

8.5–330 551.594

Kawano, Minoru (*Geoph. Inst., Univ. of Tokyo, Japan*), **On the changes in the atmospheric electric field on meteorologically quiet days.** *Journal of Geomagnetism and Geoelectricity*, Kyoto, 5(1/2):14–21, June **1953.** 4 figs., 4 tables, 11 eqs. **DLC**—The routine observations of the atmospheric electric field, atmospheric electric conductivity and space charge were carried out from Aug. 1948 to April 1950 at Hongo, Tokyo. In connection with the electrical characteristics of the comparatively thin layer near the ground, which should play an important role for the localization of changes in the atmospheric electric field, electric disturbances on meteorologically quiet days are examined. The electric disturbances on these days are divided into seven cases, and the correlation coefficients between these electric quantities in individual cases are obtained. The result shows that, when the time derivative of electric field, $\partial E/\partial t$, is smaller than $4\pi\lambda E$, the electric field is mainly subject to its simple relation to conductivity $\lambda$, space charge $\rho$ and vertical wind velocity $w$ near the ground, namely, $\lambda E+\rho w$ =const. *Subject Headings:* **1. Atmospheric electricity 2. Electrical conductivity of air 3. Hongo, Tokyo, Japan.**—*Author's abstract.*

8.5–331 551.594:551.513.2

Schaefer, Vincent J. (*Munitalp Foundation, Inc.*), **Atmospheric electricity associated with jet streams.** Paper presented May 20, 1954, First International Symposium on Atmospheric Electricity, Portsmouth, New Hampshire. *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 42:59–66, Nov. **1955.** 3 figs., 11 refs. **DLC.** Also issued in typescript. 16 p. 11 refs.—Three types of atmospherics are differentiated: 1) fair weather, 2) storm and 3) jet-stream. The simple methods of recording the latter, which were devised by the author and collaborators at General Electric and based on experience at Mt. Washington, are described. The sign and magnitude-range of the currents involved in these types of atmospheric electricity currents, their explanation and importance are discussed.

*Subject Headings:* **1. Jet stream sferics 2. Atmospheric electric currents 3. Mt. Washington N. H.**—*M.R.*

8.5–332 551.594.11:551.501.8

Israël, H. and Theunissen, E., **Luftelektrisches Potentialgefälle und Weltgewitter tätigkeit—ein Beitrag zur grossräumigen luftelektrischen Synopsis.** [Potential gradien and world thunderstorm activity: a contribution to large scale atmospheric electric synopsis. *Naturwissenschaften*, 44(1):8, Jan. 1, **1957.** fig., 2 refs. **DWB**—In Sept. 1956 potentia gradient and vertical current on quiet nights on Jungfraujoch and Gornergrat were related t records of sferics on 27 kHz at Zurich and Payerne, from the Central American thunderstorn region. Close agreement is shown. *Subject Headings:* **1. Potential gradient variation 2. Sferics records 3. Switzerland.**—*C.E.P.B.*

8.5–333 551.594.12:551.510.53

Johnson, Charles Y. and Heppner, James P. (*Naval Res. Lab., Wash., D. C.*), **Night-time measurement of positive and negative ion composition to 120 km by rocket-borne spectrometer** *Journal of Geophysical Research*, Wash., D. C., 60(4):533, Dec. **1955.** ref. **DLC**—Tw Bennett radio frequency mass spectrometers were flown in Aerobee rocket NRL No. 23 a White Sands on July 8, 1955 (1:39 a.m. local time), and positive and negative ion compositio in range from 5 to 58 atomic mass units measured from 98 to 120 km. Difficulties encountere in flight of Viking 10 were not experienced. Positive ions appeared only at atomic mass No. 2 attributed to $N_2$. No negative ions were detected. Sporadic E reflections were observe at 2.8 to 5.0 mc/sec at 100 km and appeared to be fairly stable. No magnetic disturban was noted during 2 days centered on firing time. The $N_2$ ionization contradicts curren theories that sporadic and normal E layer ionization is due to O, $O_2$ or NO. *Subject Headings* **1. Sporadic E layer (Es) ionization 2. Nocturnal E layer ionization 3. Rocket observation 4. White Sands, New Mex.**—*M.R.*

8.5–334 551.594.1

Watanabe, Satosi and Oleson, Norman L. (*U. S. Naval Postgraduate School, Monterey California*), **Traveling density waves in positive columns.** *Physical Review*, N. Y., 99(6):1701 1704, Sept. 15, **1955.** 4 foot-refs., numerous eqs. **DLC**—The continuity equations fo positive ions and for electrons coupled to each other by the Coulomb force and the effect o ionizing collisions have a solution representing traveling density waves whose frequencie are widely different from the usual plasma oscillations. *Subject Heading:* **1. Ion balanc equations.**—*Authors' abstract.*

8.5–335 551.594.

†Pierce, E. T., **Lightning.** *Science Progress*, London, 45(177):62–75, Jan. **1957.** eq 28 refs. **DWB**—This summary describes recent advances in knowledge of thundercloud electrification. The production and distribution of charges, initiation and development o discharges, including discharge to earth and return stroke, are discussed and theories considered Importance of lightning statistics for electric power distribution and because of interferenc with radio communication is emphasized and research on atmospherics described. *Subje Headings:* **1. Lightning 2. Thunderstorm electricity.**—*C.E.P.B.*

8.5–336 551.594.2

Wilson, C. T. R., **A theory of thundercloud electricity.** *Royal Society of London, Proceed ings, Ser. A*, 236(1206):297–317, Aug. 2, **1956.** 9 refs. **DWB**—The thundercloud is regarde as a great influence machine, the ionization currents associated with it being the agents b which its electromotive force is developed and maintained. The moving ions which constitut these currents may be intercepted by solid or liquid cloud elements so that it becomes possibl for them to be carried against the field and so increase an existing electromotive force. Th early stages in its growth are due to the ionization current within the cloud initiated by th earth's fine-weather field. Later it is the external currents due to the thundercloud's ow field which are effective. Lightning discharges may themselves contribute to the electromotiv force of the thundercloud. *Subject Heading:* **1. Thunderstorm electricity.**—*Author's abstract.*

8.5–337 551.594.22

†Saxe, R. F. (*Queen Mary College, Univ. of Lond.*) and Meek, J. M. (*Prof. Electrical Eng., Univ. of Liverpool*), **Initiation mechanism of long sparks in point-plane gaps.** *Institution of Electrical Engineers, London, Proceedings, Pt. C, Monographs*, 102(2):221–230, Sept. **1955.** 4 figs., 26 refs. **DLC.** Also issued as an *Institution Monograph*, April **1955.**—Investigations have been made of the optical and electrical characteristics of the corona discharges and leader strokes preceding the impulse breakdown of positive-point/negative-plane gaps in air at atmospheric pressure. The results show that initially a corona discharge forms in the highly stressed region round the pointed electrode; this corona gives rise to a short-duration (~0.4 microsec) pulse of light emission in the gap, accompanied by a similar pulse of current in the circuit. The size and shape of the light-emitting volume in this corona discharge have been studied. The next stage in the growth of the spark is the development of the leader stroke from the corona. The leader stroke grows across the gap in a predictable manner, and the current flowing in the circuit during the growth depends on the velocity of the leader stroke. The size and configuration of the light-emitting volume of the leader stroke are similar to those of the corona. The characteristics of the corona and leader stroke in air at reduced pressures and in oxygen, nitrogen and hydrogen are also briefly described. *Subject Headings:* **1. Lightning research 2. Electrical discharges.**—*Authors' abstract.*

8.5–338 551.594.222:537.5

Michnowski, Stanislaw (*Zakład Geofizyki Polskiej Akademii Nauk*), **Wpływ wyładowan z ostrzy na wartość natężenia pola elektrycznego przy powierzchni ziemi.** [Influence of point discharge currents on the earth's electric field.] *Acta Geophysica Polonica*, Warsaw, 3(3):115–130, **1955.** 5 figs. (incl. photo), 20 refs., 3 eqs. English summary p. 129. **DLC**—Point discharge current, flowing through the point set up at a height 19.2 m above the ground, and electric field near the ground have been measured during the thunderstorms in Geophysical Observatory in Świder. The measurements showed that the changes of electric field were in an advance of the corresponding changes of point discharge current, and that during some long periods, lasting sometimes 10 minutes, the current flowed in opposite direction to the direction of electric field measured simultaneously. This was in accordance with the observations published by C. W. Lutz (1940) and W. C. A. Hutchinson (1951), who attributed the above phenomena to space charge located in the layers of air near the ground. In the present article this interpretation has been extended. Space charges can change the field not only near the ground, but also near the installed point. At fast changes the space charges, placed near the point, influence the changes of the point discharge current while their effect upon the field near the ground may be omitted. To these local charges could be referred the phenomena of the advancement of field changes ahead of the corresponding point current changes. In quasi-stationary states however the observed phenomena of the opposite directions of the measured field and current are brought about by the effect of space charge located in the layers of air near the ground. Certain suggestions concerning the problems of lightning protection have been made. Influence of space charge on the electric field near the installed point (lightning rod), and near the ground contribute to the formation of upward streamers when the leader of lightning approaches the earth. At last a critical review of the measurements and some requirements about further investigations are given. *Subject Headings:* **1. Earth's electric field 2. Point discharges 3. Lightning protection.**—*Author's abstract.*

## SFERICS AND RADIO METEOROLOGY

*See also:* **Radio Met. Conference, 3rd meeting,** 8.5–60; **Pulse radar performance** (Hall), 8.5–138; **Ionospheric patterns and field strengths** (Drummond), 8.5–179.

8.5–339 551.594.7:621.396

†Norton, K. A.; Rice, P. L.; Janes, H. B. and Barsis, A. P. (all, *Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.*), **Rate of fading in propagation through a turbulent atmosphere.** *Institute of Radio Engineers, N. Y., Proceedings*, 43(10):1341–1353, Oct. **1955.** 13 figs., table, 22 refs., numerous eqs. **DLC**—Fading rate is defined to be the number of times per minute that the envelope of the received field crosses its median level with

a positive slope. This definition of fading rate is equally useful for ionospheric or tropospheric propagation studies. Furthermore, it may be used with equal facility on short transmission paths where the ground wave component of the received field predominates and on the longer transmission paths where the scattered component of the received field predominates. It is shown that this definition of fading rate provides a quantity which is numerically related to the parameters of the propagation medium under certain conditions which are normally satisfied in either ionospheric or tropospheric propagation studies. The pertinent parameters of the propagation medium in beyond-the-horizon transmission are the location and shape of the scattering volume and the turbulent and drift velocities of the scatterers. An extensive discussion is given of the shape of the tropospheric scattering volume for beyond-the-horizon transmission. An analysis is then given of some fading rate data obtained in the National Bureau of Standards tropospheric propagation program in the 92 to 1046 mc range of frequencies on transmission paths 70, 97, 226, and 394 miles in length. Finally an analysis is given for within-the-horizon propagation. In this case it is advantageous to define fading rate as the number of times per minute that the phase of the received field crosses its median level with a positive slope. *Subject Headings:* **1. Radio wave propagation 2. Radio fading 3. Turbulence effects.**—*Authors' abstract.*

8.5–340 551.594.7:621.396

†Norton, K. A.; Rice, P. L. and Vogler, L. E. (all, *Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.*), **Use of angular distance in estimating transmission loss and fading range for propagation through a turbulent atmosphere over irregular terrain.** *Institute of Radio Engineers, N. Y., Proceedings*, 43(10):1488–1526, Oct. **1955.** 40 figs., 56 foot-refs., 71 eqs. **DLC** –A discussion is given of the transmission loss expected in free space with various types of antennas, followed by a description of theoretical prediction curves for the transmission loss expected in tropospheric propagation on over-land paths. The Bremmer-van der Pol theory of diffraction and the Booker-Gordon and Weisskopf-Villars theories of tropospheric forward scattering are then developed in terms of angular distance as a parameter. Angular distance is the angle in the great circle plane between the radio horizon rays from the transmitting and receiving antennas. It is shown that this parameter replaces, to a first order of approximation, both the transmission path length and the antenna heights. Angular distance is shown to be useful for predicting the short term within-the-hour fading range as well as the median transmission loss. Illustrations are presented of the theoretical dependence of transmission loss on the angular distance, transmission path length, antenna height, radio frequency, and a parameter $\Delta N$ which is a measure of the vertical gradient of atmospheric refractive index. Most of the long-term variations of the scattered field intensities with time, as well as the climatological variations, are attributed to changes in $\Delta N$. A new theory of obstacle gain is developed, and it is shown that this is particularly useful for explaining some of the unusually strong fields which have been observed just beyond the horizon in overland propagation. The diffraction and scattering theories are compared with extensive data on radio transmission loss involving 136,000 hourly median values recorded over 122 propagation paths at frequencies between 66 and 1046 megacycles. Estimates of the Booker-Gordon scattering parameter $[\overline{(\Delta n/n)^2}/l_0]$ and of the Weisskopf-Villars scattering parameter $\{[\overline{(dn/dh)^2}]-[\overline{(dn/dh)}]^2\}$, determined from our median radio data and normalized to a height of one kilometer above the surface, are considered to be correlated with the gradient of refractivity, $\Delta N$. The radio data indicate that the magnitude of the scattering cross section decreases in inverse proportion to the radio frequency in the range we have studied. This provides strong evidence in favor of the Weisskopf-Villars tropospheric forward scattering theory presented elsewhere in this issue of the **Proceedings.** Theoretical curves of the average value of the path antenna gain to be expected in tropospheric forward scatter propagation are presented as a function of the angular distance, the asymmetry factor, and the free space gains of the transmitting and receiving antennas. *Subject Headings:* **1. Radio wave propagation 2. Radio fading 3. Radio transmission 4. Turbulence effects.**—*Authors' abstract.*

8.5–341 621.396

Sulzer, Peter G. (*Nat. Bureau of Standards, Wash., D. C.*), **Sweep-frequency pulse-transmission measurements over a 2400-km path.** *Journal of Geophysical Research*, Wash.,

D. C., 60(4):411–420, Dec. **1955.** 8+ figs., 5 refs. **DLC**—The paper shows some sweep-frequency pulse-transmission records obtained over a 2400-km path during the winter of 1953–1954. Although a detailed analysis of the records has not been completed, some preliminary results are given. Among the most significant of these is observed oblique-incidence propagation on numerous occasions at frequencies considerably above the maximum usable frequency as computed from vertical-incidence ionospheric observations at the midpoint of the path. *Subject Heading:* **1. Radio wave propagation.**—*Author's abstract.*

8.5–342 551.510.52:551.594.7

Tidd, W. H. (*Bell Telephone Labs., N. Y.*), **Demonstration of bandwidth capabilities of beyond-horizon tropospheric radio propagation.** *Institute of Radio Engineers, N. Y., Proceedings*, 43(10):1297–1299, Oct. **1955.** 8 figs. (incl. photos). **DLC**—Tropospheric radio transmission beyond the horizon is characterized by rapid and selective fading, which suggests a possible limitation on the useful bandwidth. The tests discussed were made to explore the bandwidth capabilities of this medium. Bell Telephone Laboratories conducted these tests in cooperation with the M.I.T. Lincoln Laboratory on a 188-mile path at 5050 mc with a power of 300 w and 28-foot paraboloidal antennas. Two types of tests were made. First a 12-voice-channel multiplex system for intermodulation crosstalk. IF band was 1.3 mc. Then television tests were made with a deviation of ±4 mc and IF bandwidth of 30 mc. No significant impairment in system quality could be attributed to distortion in transmission medium in either test. *Subject Headings:* **1. Tropospheric radio wave propagation 2. Radio wave transmission.**—*Author's abstract.*

8.5–343 551.594.7:551.510.535

Uyeda, H.; Ogata, Y.; Uchikura, K.; Arima, Y. and Obayashi, H., **Three components of the field strength of the wave reflected from the surface of the ionosphere: their level and time variation.** *Japan. Radio Research Laboratories, Tokyo, Journal*, 2(8):143–161, April **1955.** 10 figs., refs., 40 eqs. **DWB**—Sky waves reflected from the surface of the ionosphere represent the different field strength varying with time for the different components in level and form. Especially, the fading of the different components are not always of the same phase or form and sometimes not of the same period. On the other hand, the ionospheric observation has revealed that the ionosphere flows with irregular surface, which produce the variation of the same order as that of the fading period of *E* and *F* echoes. In order to approach these observational results, the field strength of the three components of the received wave is estimated theoretically in the case where the form of the reflecting surface of the ionosphere is mathematically defined and the velocity is assumed. A few examples thereof are illustrated. Finally the formula to give the fading period is derived in simple cases where two clouds or a series thereof of the same form move in the same direction at the same velocity, keeping constantly a short interval of time. The calculated result coincides well with the observed one, when they are assumed to be separated by the distance of several kms and to have the velocity of about 0.1 Kc/sec. *Subject Headings:* **1. Ionospheric radio wave reflection 2. Ionospheric movements.**—*Author's abstract.*

8.5–344 551.594.7 621.396.11

†Wheelon, A. D. (*Ramo-Wooldridge Corp., Los Angeles, Calif.*), **Note on scatter propagation with a modified exponential correlation.** *Institute of Radio Engineers, N. Y., Proceedings*, 43(10):1381–1383, Oct. **1955.** 14 refs., numerous eqs. **DLC**—A phenomenological exponential space correlation of dielectric fluctuations is normally used to predict scatter field strengths beyond the horizon. This paper introduces a modified exponential model which includes effects of the smallest blob cutoff in the turbulent spectrum and rectifies the correlation's cusp at the origin. It is found that the present agreement of troposphere scatter experiments with the exponential function does not depend on this cusp. It is suggested that frequency-dependent tropospheric fields recently measured below 25 cm may indicate the influence of the correlation's fine structure. The same model is then applied to the ionosphere, where the extended range VHF scatter wavelengths just straddle the smallest blob size ($\sim$3 m) in the E layer. The turbulence fine structure is most important for this propagation and gives a qualitative explanation of the curious dualism in frequency scaling laws observed at opposite

ends of the VHF band. Satisfactory variation of signal strength with scattering angle is also predicted by this model. It is shown that scatter measurements can provide valuable estimates of the atmosphere's fine structure at various heights. *Subject Headings:* **1. Radio wave scattering 2. Ultrashort wave propagation.**—*Author's abstract.*

8.5–345 551.594.7:621.396

Wieder, Bernard (*Nat. Bureau of Standards, Boulder, Colorado*), **Some results of a sweep-frequency propagation experiment over an 1150-km east-west path.** *Journal of Geophysical Research*, Wash., D. C., 60(4):395–409, Dec. **1955.** 11 figs., 2 eqs., 9 refs. **DLC**—Data from an oblique-incidence time-delay measurement experiment over an 1150-km east-west path between Sterling, Virginia, and St. Louis, Missouri, are used to examine the accuracy of the transmission-curve method of determining oblique-incidence ionosphere characteristics from vertical-incidence soundings. The experiment employed a pulsed sweep-frequency ionosphere recorder at each of the endpoints and another at the midpoint of the great-circle path. A small but consistent difference between the maximum usable frequencies (MUF) observed at the endpoint stations and the MUF determined from the vertical-incidence soundings was found. Seasonal trends of this difference are presented. The results of the analysis indicate that the average error of the transmission-curve-derived MUF varies between zero and 5 percent too low, depending on time of day and season. Random variations result in a spread of about 10 percent between the upper and lower decile errors. *Subject Heading:* **1. Radio wave propagation.**—*Author's abstract.*

8.5–346 551.594.7(521.2):621.396.11

Tohsha, M., **On the superrefraction of microwave in Kanto District.** *Journal of Meteorological Research*, Tokyo, 7(7):446–454, Oct. **1955.** 12 figs., 3 tables, 8 refs., 7 eqs. In Japanese; English summary p. 446. **DWB**—Radar echoes accompanying superrefraction which is anomalous propagation of radar wave were observed before sunset on Aug. 5, 1954 in Kanto district. Whether the phenomenon depends on the $k$-type refraction in which the effective radius of the earth increases, or on the duct type in which the distribution of refractive index $N$ or $M$ decreases with height in the surface layer of the atmosphere, is discussed. From the judgment of observational data at Tateno and Tsukuba, it is found that $k$-type anomalous propagation had not occurred. It is considered that the phenomenon of superrefraction occurred as the duct type, from the minute analysis of aerological sounding at Tateno. Also, the formation of duct was discussed synoptically, using the data observed in the networks of meteorological stations in Kanto district, and the condition that the two air flows were mixed in the surface layer was found to be necessary for the formation. The 4000-megacycle receiving and its recording of one way transmission between Mitaka and Tsukuba were operated by the Electric Communication Laboratory, and the attenuation of duct layer was observed in the period of the anomalous echoes, the value of which attained to about 10 decibel. On the other hand, a condition that air flows were not mixed was investigated, in which case such superrefraction as the above-mentioned was not found. *Subject Headings:* **1. Superrefraction 2. Radar propagation 3. Kanto District, Japan.**—*Author's abstract.*

# PART II. RECENT LITERATURE ON HYDROLOGIC FORECASTING

Compiled by: *Geza Thuronyi*

The following is a continuation of the compilation of current literature on specialized forecasting techniques started in the March 1957 issue of *MAB*. Recent literature on hydrologic forecasting accumulated in the process files of *MAB* is presented in sections on **Precipitation and Drought** (8E-1 to 8E-41), **Snow melt, Runoff and Water supply** (8E-42 to 8E-65) and **Flood, River flow and River freezing** (8E-66 to 8E-103). To these are added a few papers on the forecasting of **Ocean waves, Sea ice and Sea temperature** (8E-104 to 8E-114). It should be emphasized that this is not a systematic bibliography but merely a collection of material available in the *MAB* files at this given moment. In order to facilitate a more thorough search of the field the subject outline presented below includes references to abstracts on hydrologic forecasting published in previous issues of *MAB*.

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## PRECIPITATION, DROUGHT

**8E–1** 551.509.324:551.577.37:551.571.1

§Arakawa, Shoichi, **Quantitative prediction of heavy rainfall (Study of precipitation, Pt. 1).** *Journal of Meteorological Research,* Tokyo, 6(10/11):554–566, Dec. **1954.** 9 figs., 2 tables, 3 refs., 5 eqs. In Japanese; English summary p. 554. Also in: *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Meteorological Society of Tohoku District,* 8(2):554–561, Jan. **1955. DWB**—A method for predicting quantitatively the amount of heavy rainfall useful in upper air analysis at Sendai is developed. The rainfall amount is given by the equation $i = -c\left.\frac{\partial \mu}{\partial t}\right|_0 - \frac{\partial \mu}{\partial t}$. $\Delta\mu/\Delta t$ is considered just before the beginning of rainfall ($\mu$—preipitable water). The time change of precipitable water (1000–400 mb aloft at Sendai) associated with the moist tongue is investigated. *Subject Headings:* **1. Precipitation forecasting 2. Excessive rainfall 3. Precipitable water 4. Sendai, Japan.**—*Based on author's abstract, I.L.D.*

**8E–2** 551.509.324

Asakura, T., **Forecasting of precipitation. (Rainfall accompanying typhoon, Pt. 2.)** *Meteorological Society of Japan, Journal,* 2nd Ser., 31(9):306–312, Sept. **1953.** 5 figs., 9 refs., 11 eqs. **DWB, DLC**—A formula is developed in which rainfall intensity is expressed as a function of mixing ratio and velocity divergence at the 700 mb surface and velocity divergence at the 500 mb surface. The formula is applied to the synoptic situations (involving typhoons) of Sept. 2, 1950 and July 17, 1951 and compared in charts with corresponding rainfall amounts. A graphical comparison of calculated and observed precipitation is also presented. *Subject Headings:* **1. Precipitation forecasting 2. Objective forecasting.**—*G.T.*

**8E–3** 551.577.38:551.509.318

§Berkes, Zoltán, **Az 1953. évi márciusi szárazság makroszinoptikai és periodológiai jellemzése.** [Macrosynoptic and periodical analysis of the drought of March 1953.] *Beszámolók az 1955-ben végzett tudományos kutatásokról* (issued as *Hungary. Országos Meteorológiai Intézet, Hivatalos Kiadványai,* Vol. 20, pub. **1955**) p. 41–57. 20 figs., 5 refs. Russian and French summaries p. 41. **DWB**—Peculiarities of March 1953 are determined by comparison with long climatic records (pressure, precipitation, sunshine duration). The synoptic development is shown in composite charts of anticyclone tracks and pressure anomaly variations; 5-year and 2–3-year periodicities of pressure conditions in March are discussed in detail. These periodicities are found to manifest themselves in changes of the meridional circulation and to be connected with variations of geomagnetic activity. Circulation types persist for several months; hence the pressure situation in March has a certain long-range forecasting value for the entire year (the correlation dry March-dry year and wet March-

wet year occurred with a probability of about 80% in the last 50 years). Secular changes of pressure and precipitation conditions in March are discussed on the basis of the last 100 years' data. *Subject Headings:* **1. Drought forecasting 2. Synoptic analysis of drought 3. Hungary.**—*Trans. of author's abstract.*

**8E–4** 551.509.324:551.511.3

Bodolai, István, **A súrlódási réteg hatása a csapadékképződésre és a csapadék eloszlására.** [Effect of the friction layer on the formation and distribution of precipitation.] *Beszámolók az 1955-ben végzett tudományos kutatásokról* (issued as *Hungary. Országos Meteorológiai Intézet, Hivatalos Kiadványai*, Vol. 20, pub. 1955) p. 239–248, fig., 2 tables, 4 refs., 11 eqs. Russian and German summaries p. 239. **DWB**—Methods of determining qualitative and quantitative properties of the meteorological factors involved in precipitation formation are reviewed. The determination of advective and nonadvective temperature, humidity and pressure changes is treated in detail. Effects of the friction layer on the intensity and areal distribution of precipitation are discussed. In this connection A. N. Mertsalov's and A. F. Diubiuk's methods of calculating vertical upward currents are described. *Subject Headings:* **1. Precipitation forecasting 2. Frictional effects.**—*Trans. of author's abstract.*

**8E–5** 551.509.324

§Bristor, Charles L., **Preliminary report: forecasting the occurrence of winter precipitation at Cairo, Illinois 30 to 42 hours in advance.** Oct. 1952. 5 p. 11 figs., 4 charts, ref. Photostat of typescript. **DWB**—During the winters of 1948 to 1952, 12 cases were found where all four district forecasters around Cairo, Ill., missed forecasting precipitation with amounts ranging from .22 to 2.25 inches. The most frequent error occurred when a secondary formed to the SW after a deep Low had passed to the NE. Another type was the fast moving Low from the Pacific NW. The third type is a low index type. Objective aids are developed and presented, based on these situations, with rules and examples cited, and verification statistics presented. *Subject Headings:* **1. Precipitation forecasting 2. Objective forecasting aids 3. Cairo, Ill.**—*M.R.*

**8E–6** 551.509.324:551.509.317(439.1)

Bucsy, József, **Az 1952. évi őszi csapadékos időszak magaslégköri vizsgálata.** [Aerological study of the rainfall period, fall 1952.] *Beszámolók az 1955-ben végzett tudományos kutatásokról* (issued as *Hungary. Országos Meteorológiai Intézet, Hivatalos Kiadványai*, Vol. 20, pub. 1955) p. 10–24. 7 figs., 11 refs., eqs. Russian and German summaries p. 11. **DWB**—Vertical distribution and development over Budapest of upper-air factors such as gradient wind, wind shear, thermal advection, etc., are determined from time sections constructed on the basis of 700 mb and 500/1000 mb charts. The connection of these factors with the occurrence of precipitation in Hungary is analyzed. Gradient winds are also compared with pilot balloon observations (Budapest, Nov.–Dec. 1952) and the need for more soundings extending to high altitudes is stressed. *Subject Headings:* **1. Rainfall forecasting 2. Upper air analysis 3. Budapest, Hungary.**—*G.T.*

**8E–7** 551.509.324:551.509.34

Castillo, Paulo (*Meteorologist, Manila*), **On single station rain forecasting.** *Philippines. Weather Bureau, The Elements*, 3(5):7–9, May 1952. 3 refs. **DWB**—The author suggests a qualitative method of predicting rain a few hours ahead during the day, by using a set of psychrometric readings and cloud observations. The method is to be used by the "field weatherman." *Subject Headings:* **1. Single station forecasting 2. Rainfall forecasting.**—*G.T.*

**8E–8** 551.509.324

*Dickey, Woodrow W. (*U. S. Weather Bureau, Wash., D. C.*), **Forecasting summertime shower activity at Grand Junction, Colorado.** *American Meteorological Society, Bulletin*, 37(8):418–425, Oct. 1956. 4 figs., 12 tables, 4 refs. **DWB**—Due to the lack of a dense network of reporting stations in the Grand Junction, Colorado area and the inadequate representation of shower activity by observations of rain at a single rain gage, certain arbitrary criteria were set up to define a "shower" day at Grand Junction. Relationships of a number of meteorological variables to shower activity were determined and the four variables which showed the strongest relationships were combined graphically to form an objective forecast aid for determining the probability of shower activity at Grand Junction during the 18-hour period 1130 MST to 0530 MST. Tests on independent data confirm the relationship found in the developmental data. *Subject Headings:* **1. Rainfall forecasting 2. Grand Junction, Colorado.**—*Author's abstract.*

**8E–9** 551.509.324:551.577.32:551.532.21

*Doraiswamy Iyer, V. and Satakopan, V., **Regression formulae for forecasting the monsoon rainfall in the subdivisions of peninsular India.** *India. Meteorological Dept., Scientific Notes,*

101):1946. 3 figs., 6 tables, 11 refs. **DWB**—The paper begins with a brief survey of monsoon infall forecasting in India and gives the formulas used in forecasting monsoon rainfall at present. arious meteorological factors which have been found useful for forecasting monsoon rainfall in dia are correlated with the subdivisional monsoon rainfall for the twelve subdivisions in peninsular dia. The correlation coefficients of monsoon rainfall in C.P. East and C.P. West with antecedent ctors are found to be too small to give any useful forecasting formulas for these subdivisions. or the remaining ten subdivisions regression formulas are worked out; they give multiple correlation efficients varying between 0.44 and 0.65. The multiple correlation coefficients are all significant cept those for the Madras Deccan and Madras Southeast. The usefulness of the regression rmulas for forecasting is tested and it is shown that they may be expected to give forecasts of the me order of precision as for the "Peninsula" as a whole. The actual and calculated values for ght subdivisions are plotted for comparison. *Subject Headings:* **1. Monsoon rainfall forecasting Objective forecasting 3. Regression formulas 4. India.**—*Authors' abstract.*

**8E–10** 551.509.324

Estoque, Mariano A., **An approach to quantitative precipitation forecasting.** Chicago Univ. ept. of Meteorology. Contract AF 19(604)-1293, *Scientific Report* No. 7, May **1956.** 13 p. 3 figs., tables, 5 refs., 9 eqs. Also in its Final Report, Feb. **1957.** Sec. J. 13 p. 3 figs., 3 tables, 5 refs., eqs. And in *Journal of Meteorology*, 14(1):50–54, Feb. **1957.** 9 figs., 3 tables, 5 refs., 9 eqs. **WB**—A quantitative method of predicting precipitation due to large-scale vertical motions is escribed. A two-level prediction model is applied at the 1000 and 500 mb pressure levels. Solutions e obtained by a graphical procedure which enables one to obtain a 24-hour forecast in about two ours. Tests on 10 cases of major cyclone developments show some success. *Subject Headings:* **Precipitation forecasting 2. Cyclonic precipitation.**—*Author's abstract.*

**8E–11** 551.509.312:551.509.324

Fujiwara, S., **The precipitation under the assumption of dry adiabatic change and moist adiabatic hange of the air.** *Meteorological Society of Japan*, Tokyo, *Journal*, Ser. 2, 34(5):271–275, Oct. **956.** 2 figs., table, 7 refs., numerous eqs. **DWB, DLC**—It is the purpose of this paper to analyze e condensation equation used in numerical precipitation forecasting. Using this equation and the ertical motion computed from the vorticity equation the amount of heavy rainfall is calculated. connection with this problem the author attempts to calculate the amount of vapor condensation d vertical velocity under the assumption of not only dry adiabatic but also moist adiabatic change the air. *Subject Headings:* **1. Numerical forecasting 2. Precipitation forecasting.**—*Author's stract.*

**8E–12** 551.509.318:551.577

Gavrilenko, N. M., **Sinopticheskie usloviia prodolzhidetl'nykh osadkov v Kievskoĭ oblasti.** Synoptic conditions for continuous precipitation in the Kiev Oblast.] *Meteorologiia i Gidrologiia*, eningrad, No. 4:31–34, July/Aug. **1955.** 5 figs., 4 refs. **DWB**—This is a study of synoptic processes natural synoptic periods during which frequent and continuous rain fell over the Kiev Oblast and attempt to show the development of these synoptic processes. On the basis of an analysis of ily surface and upper air weather charts for the summer season (April–Sept.) for 1946–1953, ean charts and summarized kinematic charts of natural synoptic periods, four types of synoptic ocesses are established. The synoptic processes producing rain in the Kiev Oblast are characterized follows: 1) well marked meridional circulation over the territory of a natural synoptic region when e axis of an upper low is oriented from Scandinavia to the Balkans or the Western Mediterranean; ) the presence over the Ukraine of high stationary cyclone which persists during the natural noptic period; (3) and a displaced circulation with predominant zonal transfer of air masses over urope. *Subject Headings:* **1. Synoptic conditions for rainfall 2. Natural synoptic periods 3. Synptic studies 4. Kiev Oblast, U.S.S.R.**—*I.L.D.*

**8E–13** 551.509.324:551.577.37

Gilman, Charles Sherrill, **Meteorology of major storms.** Presented at meeting of Hydraulics iv. of the American Society of Civil Engineers, Austin, Texas, Sept. 8–10, 1954. Wash., D. C., . S. Weather Bureau, **1954.** 8 p. 6 figs. **DWB**—The present state of our knowledge regarding ecipitation processes is reviewed. Limitations regarding use of vertical motion as a predictor are mphasized. The continental scale of the processes connected with major storms is illustrated. nportance is attached to the energy transformations resulting from horizontal temperature conasts. Three approaches to precipitation forecasting currently making use of this concept are iefly summarized—a statistical approach by means of orthogonal polynomials, a numerical ingration of approximations to the equations of motion, and a graphical approach to approximation the future temperature. *Subject Headings:* **1. Rainstorms 2. Precipitation forecasting.**—*Author's stract.*

**8E–14** 551.509.33:551.509.324

Hirose, M.; Okuta, M. and Asakura, T., **Relationship of 5-day mean 700-mb anomaly pattern to amount of precipitation.** *Journal of Meteorological Research*, Tokyo, 7(11):705–710, Dec. **1955.** fig., 3 tables. In Japanese; English summary, p. 705. **DWB, DLC**—A study of the relation between 5-day mean 700-mb height anomalies and 5-day precipitation over Japan is summarized by enumerating several rules for the several seasons. The types differentiated by K. Takahashi and M. Iida (1955) are highly correlated with precipitation amount in Japan. For example, when below normal anomaly occurs in low latitudes to the W. of Japan and up to 20° N or more, heavy rainfall of the typhoon type occurs, while when it is below normal at low latitudes to the SE of Japan, light rainfall occurs. *Subject Headings:* **1. Extended forecasting 2. Precipitation forecasting 3. 5-day anomaly types 4. Japan. I. Takahashi, K.**—*M.R.*

**8E–15** 551.509.324:551.515.8

*Hunter, Robert S. (*Meteorologist, Panair do Brasil*), **Correlation of monsoon rain of Northeast Brasil with polar pressure waves and polar front frontolysis. 1956** [?] 12 p. 9 figs. Mimeo. (1953 data analyzed, also 1954, but not included). **DWB**—On the basis of an analysis of the trade wind monsoon rains the author develops the hypothesis that "polar pressure waves and polar front frontolysis have a direct association with the rainfall of a typical monsoon season." This seasonal rain is a maritime phenomenon of the southwest trade winds during late fall-early winter (Southern Hemisphere) and is "located dynamically along the northeast sector of a semi-permanent high altitude midway between the equatorial easterlies and the northern boundary of the westerlies over a warm equatorial water current." The evidence supporting the hypothesis that cool air advection is the initiating cause of the monsoon rains is derived from RAOB/RAWIN data. Rain cloud types, polar front influence, shearline flow patterns conducive to rain are discussed and the correlation of rainfall with polar pressure and frontolysis are analyzed synoptically. *Subject Heading:* **1. Monsoon rainfall forecasting.**—*I.L.D.*

**8E–16** 551.509.324(522.3)

Imada, M. and Sudo, T., **Heavy rainfall forecasting in Tokushima Prefecture.** *Journal of Meteorological Research*, Tokyo, 4(9):631–641, Feb. **1953.** 12 figs., 3 tables. In Japanese; English summary p. (39). **DWB, DLC**—The distribution of intense precipitation in Tokushima Prefecture can be classified into 12 types from the point of view of quantitative forecasting. Precipitation amounts in various parts of Tokushima Prefecture can be determined from those of Tokushima City. *Subject Headings:* **1. Rainfall forecasting 2. Precipitation distribution 3. Tokushima Prefecture Japan.**—*Authors' abstract.*

**8E–17** 551.509.324:551.577.32(52

Kimachi, T. and Tokuda, M., **Method for forecasting rainfall in Bai-u season.** *Journal of Meteorological Research*, Tokyo, 7(5):326–328, July **1955.** 6 figs., 2 refs., 2 eqs. In Japanese. **DWB**—Nomograms are presented for use in quantitative forecasting of Bai-u rainfall from cloud thickness, moisture content of air up to 300 mb, etc. *Subject Headings:* **1. Rainfall forecasting 2. Bai-u 3. Japan.**—*M.R.*

**8E–18** 551.509.318:551.577.34

§Krustanov, L. and Ganev, G., **A bulgáriai meteorológiai kutatások egyik iránya.** [One of the fields of meteorological research in Bulgaria.] *Időjárás*, Budapest, 58(6):373–379, Nov./Dec. **1954.** 13 figs. Russian and French summaries p. 373. Trans. by Mrs. L. Faragó. **DWB**—Also complete German version: **Über eine Richtung der bulgarischen meteorologischen Forschungen.** *Acta Agronomica*, Budapest, 5(1/2):145–154, **1955.** Russian and English summaries p. 154. **DA**—In studying the development of synoptic situations causing drought in Bulgaria it was found that the first step would be to investigate the stable anticyclonic situations. Anticyclonic influences causing severe drought in different seasons may be classified in four groups: 1) western (Azorean), 2) northwestern (Arctic), 3) northeastern (Arctic) and 4) combined influences. Mapping of these synoptic processes has been found very useful in preparing long range forecasts. *Subject Headings:* **1. Synoptic conditions for drought 2. Drought forecasting 3. Bulgaria. I. Faragó, Mrs. László** (*tr.*).—*Trans. of author's abstract.*

**8E–19** 551.509.324(51

Ku, Chen-chao (*Peking*), **Nyári csapadékok előrejelzése Kína területén természetes szinoptikus időszakra.** [Forecasting of summer precipitation for natural synoptic periods in China.] *Időjárás*, Budapest, 58(6):418–425, Nov./Dec. **1954.** 10 figs. Russian and French summaries p. 418. Trans. by Z. Ozorai. **DWB**—Also complete German version: **Die Prognose der Sommerniederschläge auf dem Gebiet Chinas für die natürlichen synoptischen Zeitabschnitte.** *Acta Agronomica*, Budapest, 5(1/2):219–229, 1955. Russian and English summaries p. 229. **DA**—Limits of the

natural synoptic region of East Asia and peculiarities of the upper atmospheric deformation fields over East Asia are investigated. Relations are found between the transformation processes of the deformation field and the typhoons invading China. Relations also exist between the state of the 500 mb surface and the amount of precipitation during the natural synoptic period. An example of summer precipitation forecasting for the natural synoptic period is given. The verification score for the author's method of forecasting precipitation distribution is around 70 percent. *Subject Headings:* **1. Summer precipitation 2. Precipitation forecasting 3. Natural synoptic periods 4. China. I. Ozorai, Zoltán** (*tr.*).—*Trans. of author's abstract.*

**8E–20** 551.509.324:551.576.4

Lee, Roy, **Short-range forecasting of middle and high cloud.** *Canada. Meteorological Div., CIR*-2581, TEC-294; *Short-range forecast techniques*, No. 1, Dec. 16, **1954.** 16 p. 3 figs., 8 refs. Also his: **Short-range forecasting of frontal precipitation.** *Ibid, CIR*-2586, TEC-295, *Short-range forecast techniques*, No. 2, Dec. 21, **1954.** 8 p. 4 figs., 3 refs. Also his: **Forecasting the lowering of ceiling in continuous rain.** *Ibid, CIR*-2622, TEC-212; *Short-range forecast techniques*, No. 3, March 2, **1955. DWB, DLC**—In the first paper a forecast technique is described whereby cloudiness may be predicted by extrapolating existing cloud systems, especially those derived from aviation weather reports. The second paper deals with methods of predicting exact time of precipitation less than 12 hours in advance. They include: a) forecasting development of new precipitation areas with the help of the nephanalysis method described in the first paper and b) analysis and extrapolation of existing precipitation areas. In the third paper (ceiling in continuous rain) two forecasting methods based on extrapolation and a physical method developed by Goldman (*see* 3E–202, May 1952, *MAB*) are described. *Subject Headings:* **1. Short range forecasting 2. Precipitation forecasting 3. Cloud forecasting 4. Ceiling height forecasting.**—*G.T.*

**8E–21** 551.577:551.582(52)

Masatsuka, A. and Machii, K., **On the return period of the continuance of rainless days in Japan.** *Journal of Meteorological Research*, Tokyo, 8(7):400–408, Aug. **1956.** 5 figs., 2 tables. In Japanese; English summary p. 400. **DWB, DLC**—The design projects involving the use of water for irrigation, water power or water supply are more frequently related to low flows than to high flows. Data such as the return period of the continuance of rainless days are, therefore, basic information for such projects. In the present paper the authors analyze the frequency distributions of the continuance of rainless days at many places in Japan. Results of the investigation are presented. *Subject Headings:* **1. Precipitation deficiency recurrence 2. Japan.**—*Authors' abstract.*

**8E–22** 551.509.318:551.579.4

Michalczewski, Jerzy, **Meteorologiczna analiza powodzi z 10 i 11 maja 1951 r.** [Meteorological analysis of flood of May 10th and 11th, 1951.] *Przeglad Meteorologiczni i Hydrologiczny*, Warsaw, 5(3/4):107–113, **1953.** 4 figs. **DWB**—A detailed analysis of atmospheric conditions over Europe before the flood and the following gradual development of the meteorological situation which caused the peculiar distribution of rainfall (much more precipitation on the northern outer mountain slopes than on the southern inner mountain slopes) is presented and shown on weather maps and graphs. The phenomena caused by an unusual convergence of circumstances could have been foreseen if the following aids had been used: carefully analyzed synoptic charts of Europe including the Mediterranean Sea; maps of thermobaric fields of the lower portions of the troposphere; results of aerological soundings in Hungary, Czechoslovakia and Poland and a map of 12 hour isallobars. *Subject Headings:* **1. Synoptic conditions for floods 2. Synoptic analysis 3. Floods, Poland (May 1951) 4. Rainfall distribution 5. Poland.**—*A.M.P.*

**8E–23** 551.509.324:551.511:551.571

Miyakoda, K. (*Tokyo Univ.*), **Forecasting formula of precipitation and the problem of conveyance of water vapor.** *Meteorological Society of Japan*, Tokyo, *Journal*, Ser. 2, 34(4):212–225, Aug. **1956.** 10 figs., 13 refs., numerous eqs. **DWB, DLC**—A numerical prediction scheme for precipitation is discussed in detail. First the forecasting formula for precipitation for a small time interval is shown in comparison with Smagorinsky and Collin's formula. Second, an applied example of this method is displayed with an explanation of technique. Third, the scheme of extension of forecast period with respect to rainfall forecast is described. Fourth, water vapor prediction is investigated, which is important for the forecast of movement of rainy region. Fifth, the wind involved in water vapor advection is considered, especially at the 1000 mb level. In this test the surface wind is calculated considering the non-geostrophic wind component proposed by Hinkelmann. Comparison of the calculated wind with the observed leads to the conclusion that wind direction agrees very well but the speed of the calculated wind is exceedingly larger than that of the observed. *Subject Headings:* **1. Precipitation forecasting 2. Water vapor transport.**—*Author's abstract.*

**8E–24** 551.577.1

Mohri, K. (*Japan Meteorological Agency*), **An aerological study of heavy rainfall over west and central Japan during early summer 1953.** *Meteorological Society of Japan*, Tokyo, *Journal*, Ser. 2, 34(5):244–253, Oct. **1956.** 16 figs., 10 refs. **DWB, DLC**—High and middle tropospheric conditions of temperature and wind fields are analyzed in detail for heavy rainfall cases of June 26 and July 17 1953. In these cases the subtropical upper frontal zone is observed in the vertical cross sections in its well defined form. It is suggested that vertical motion associated with this upper frontal zone might be one of the factors which induce the heavy rainfall over west and central Japan during the rainy season in early summer. *Subject Headings:* **1. Precipitation mechanism 2. Japan.**—*Author's abstract.*

**8E–25** 551.509.314:551.509.324(794

Neiburger, M. (*Calif. Univ., Dept. of Meteorology*), **Selection of predictors for statistical forecasting of rainfall amounts in the "Carrizo-Tremblor" area of California, (May 1952).** *California State Water Resources Board, Bulletin*, No. 16 (Append. E):146–162, June **1955. DWB**—In Section 2 of the report a discussion is presented of the nature of forecasting precipitation, including some comments on the special difficulties involved in forecasting for the area under study. Sec. 3 contains a classification of storms producing rain there, designed specifically to facilitate the selction of forecast parameters, or predictors, for each type. Sec. 4 is devoted to a discussion of general aspects of the problem of selecting predictors. Sec. 5 gives the predictors chosen for forecasting the daily rainfall from each type, with further justification for the choice. In Sec. 6, the problem of use of predictors to forecast total rain for each storm instead of each day is discussed. *Subject Headings:* **1. Rainfall forecasting 2. California.**—*From author's abstract.*

**8E–26** 551.509.324:551.510.52/

Neyama, Y., **The relationship between the change of tropopause height at Marcus and the rainfall in West Japan.** *Journal of Meteorological Research*, Tokyo, 7(10):616–623, Dec. **1955** 15 figs., 10 refs. In Japanese; English summary p. 616. **DWB, DLC**—In a previous paper (*see* 7.6–190, June 1956, *MAB*) the author pointed out the fact that the time change of principal rainy day in the Bai-u season in West Japan corresponds to the change of tropopause height at Marcus Isle 31 days earlier. In this paper further details of tropopause height change are studied, calculating the lag correlation coefficients for tropopause heights at Marcus Isle and Kagoshima. The study shows that a distinct correspondence at the two stations with a time lag of 31 days occurs only when the transition zone between prevailing westerlies and upper easterlies above the tropopause is located in West Japan. Even so it is not evident that the principal rainy day will occur in the restricted area of West Japan rather than at any other point along the transition zone. Nevertheless, by giving special attention to the westerly wave as well as to the easterly waves in the tropical tropopause, the forecasting of Bai-u season could be improved. *Subject Headings:* **1. Rainfall forecasting 2. Long range forecasting 3. Tropopause height variations 4. Bai-u 5. Western Japan.**—*From author's abstract.*

**8E–27** 551.509.324:551.510.52/

Neyama, Y., **On forecasting of heavy rainfall in Western Japan in Bai-u season by means of the analysis of upper troposphere at Marcus Isle.** *Journal of Meteorological Research*, Tokyo, 8(12):759–764, Jan. **1957.** 7 figs., 10 refs. **DWB**—A method is described for forecasting heavy rainfall in western Japan during the Bai-u season, 31 days in advance. The variation of the height of isobaric surface in the upper troposphere at Marcus Isle which is followed 31 days later by heavy rainfall in western Japan, falls into two different types, viz., type HR and type R. Results of statistical analysis of these types may be usefully applied to forecasting. *Subject Headings:* **1. Rainfall forecasting 2. Long-range forecasting 3. Tropopause height variations 4. Bai-u 4. Western Japan.**—*Author's abstract.*

**8E–28** 551.509.324:551.577.21(52

Noguchi, K., **Forecasting the average depth of precipitation (Precipitation forecasting over the Upper Kitakami River, Pt. 3).** *Journal of Meteorological Research*, Tokyo, 8(2):77–83, March **1956** 4 figs., 3 tables, 2 refs. In Japanese; English summary p. 77. **DWB, DLC**—A method of quantitative forecasting of the average depth of precipitation is developed. The equation of continuity is divided into three terms, i.e., local changes, horizontal and vertical advection terms. These terms are calculated for the case when the surface disturbance approaches the basin and the upper stream line takes cyclonic vorticity. Precipitation over the basin is estimated by a statistical method. The method is found to have high accuracy. *Subject Headings:* **1. Precipitation forecasting 2. Area precipitation estimation 3. Kitakami River Basin, Japan.**—*Author's abstract.*

**8E–29** 551.509.324:551.577.2(521.1)

Numata, Masamichi, **Relation between beginning or ending of rainfall in the Middle and Southern parts of Tohoku District and the position of cyclone.** *Journal of Meteorological Research*, Tokyo, 6(10)/11):577–579, Dec. **1954.** 6 figs. In Japanese. Also issued in: *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Meteorological Society for Research of Tohoku District*, (2):577–579, Jan. **1955.** 5 figs. In Japanese. **DWB**—The beginning or ending of rainfall at Sendai is strongly influenced by the position of cyclone which was located on chart according to a synoptic study. *Subject Headings:* **1. Rainfall forecasting 2. Cyclone—rainfall relationships 3. Tohoku District, Japan.**—*H. Arakawa.*

**8E–30** 551.509.324:551.577.33

Oniki, N., **A note on rainfall forecasting.** *Journal of Meteorological Research*, Tokyo, 4(11):857–862, Feb. **1953.** 6 figs., 6 refs. In Japanese; English summary p. 54. **DWB**—Rainfall in source of Tokyo hydroelectric water supply, 1909–50, showed periodicities of 1–2 and 5 years and a series of types of annual variation. *Subject Headings:* **1. Rainfall periodicities 2. Japan.**—*C.E.P.B.*

**8E–31** 551.509.324:551.510.52:551.553.21(54)

§Pisharoty, P. R. and Kulkarni, S. B. (*Met. Office, Poona*), **Upper air contour patterns and associated heavy rainfall during the southwest monsoon.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(2):103–112, April **1956.** 6 figs., 13 refs., 6 eqs. **DWB, DLC**—The troposphere over India during the SW monsoon must be divided into two sectors separated by a level of non-divergence at about 600 mb, with opposing divergence-convergence values which can be determined on the 850 mb and at the 500 or 300 mb level charts, respectively. Application of theory and practical aids (e.g., Sutcliffe's rule) to forecasting during the SW monsoon, and an example for July 1, and Sept. 4, 1954 when 15–20 inches of non-orographic rain fell in the SW quadrant of a low over the Madhya Pradesh, in areas where strong divergence was found at the 500 mb level, are given. *Subject Headings:* **1. Excessive rainfall 2. Rainfall forecasting 3. Southwest monsoon 4. Tropospheric structure 5. India.**—*M.R.*

**8E–32** 551.509.324:551.553.21(54)

Rao, K. V. (*Met. Off., Poona*), **Objective method of forecasting rain at Poona during southwest monsoon.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 6(4):358–361, Oct. **1955.** Fig., 2 tables, 8 refs. **DWB, DLC**—The objective method for forecasting rain at Poona during the monsoon season for a period of 24 hours involves the following criteria: the sea level pressure difference between Honavar and Bombay and the difference in pressure at 1gpkm between Maha-baleshwar and Poona. The results of studies involving successful predictions and failures are presented. *Subject Headings:* **1. Rainfall forecasting 2. Objective forecasting methods 3. Poona, India.**—*I.L.D.*

**8E–33** 551.509.54

Rapp, R. R., **Aid in forecasting 12-hour precipitation amounts at New York City.** (U. S. Weather Bureau), March **1949.** 5 p. 6 tables, charts, 4 refs. typescript. **DWB**—Two scatter-grams and one nomogram are presented to use as aids in forecasting amount of precipitation at New York City from parameters indicative of vertical velocities in the 850 to 700 mb layer. These parameters are: (A) Advective temperature change $V \cdot \nabla T$ at 700 mb vs. $V \cdot \nabla T$ at 850 mb; and (B) $\Delta P$ Black Island–Atlantic City. Use of both (A) and (B) gives a good skill score, which holds up to .53 (86% correct) with use of independent data. *Subject Headings:* **1. Objective forecasting 2. Precipitation forecasting 3. New York City.**—*M.R.*

**8E–34** 551.577.37(74/77):551.509.324

Schloemer, R. W. (*U. S. W. B., Wash., D. C.*), **An empirical index of seasonal variation of intense precipitation over large areas.** *Monthly Weather Review*, Wash., D. C., 83(12):302–313, Dec. **1955.** 35 figs., 6 refs. **DWB**—Since there is no accurate physical method for determining seasonal variations of heavy rainfall over large areas and moderately long periods of time (20,000 sq mi and 72 hrs, say), engineering techniques were used to construct 26 bi-weekly charts of probability of occurrence of heavy rain in the eastern U. S. Several examples (e.g., from east Texas, precipitation >1", 1906–35, for each week of the year) showing methods of calculation of envelopes and 99%, 95% and smoothed mean values, basic data from Corps of Engineers and average depth along a latitude strip (40°–42°N) and a longitude strip (89°–91°W) and a chart showing lines of equal likelihood of precipitation of 3", 4", 5", 15" or 16" in 72 hrs over 20,000 sq mi are included. A tongue of maximum frequency runs north along Mississippi Valley from Gulf of Superior and another lesser maximum along east coast. *Subject Headings:* **1. Heavy rainfall occurrence charts 2. Precipitation variations 3. Eastern United States.**—*M.R.*

8E–35 551.509.324:551.515.8(481

§Spinnangr, Finn and Johansen, Harald, **On the distribution of precipitation in maritime tropica air over Norway.** *Meteorologiske Annaler*, Oslo, 3(14):351–424, **1954.** 40 figs., 2 tables, char (fold). **DLC**—Two cases in which heavy precipitation was associated with maritime tropical ai over Southern Norway are discussed. The weather situation, the distribution of precipitation i Norway, the upper air circulation for March 23–26, 1953 and Oct. 9–11, 1953 are analyzed. Th characteristics of tropical air and the flood and damage cause are described. The forecasting o precipitation from tropical air with special reference to Norway is considered. *Subject Headings* **1. Rainfall forecasting 2. Maritime tropical air 3. Norway.**—*I.L.D.*

8E–36 519.241.1:551.577.2:551.54

*§Stidd, C. K., **The use of correlation fields in relating precipitation to circulation.** *Journal o Meteorology*, 11(3):202–213, June **1954.** 9 figs., 2 tables, 13 refs., 8 eqs. **DWB**—Charts are give of distribution of correlation coefficients of monthly pressures at points in U. S. with monthly pre cipitation areal means for individual states and for the whole U. S. Pressures at 300, 500, 700 m and sea level gave similar fields and 700 mb was taken as standard. The charts are interpreted i terms of pressure differences. The correlation technique is shown to be more sensitive than othe methods. To eliminate skewness, cube roots of precipitation totals were used. A close relatio was found in winter but not in summer. The use of ten independent centers gave multiple correla tions up to 0.8. *Subject Headings:* **1. Correlation coefficients 2. Precipitation anomalies 3. Uppe air pressure 4. United States.**—*C.E.P.B.*

8E–37 551.509.324:551.577.3:551.515.

Suzuki, E., **Objective method of forecasting rainfall amount caused by typhoons in Kant District. (Statistical investigations of precipitation, pt. 2.)** *Journal of Meteorological Researc* Tokyo, 7(3):148–158, March **1955.** 13 figs., 4 tables, foot-refs., 3 eqs. In Japanese; Englis summary p. 148. **DWB**—The author examined the forecast of rainfall amount in the Kantō district when the center of a typhoon comes to 30°N latitude. The factors considered in this study are a follows: 1) Predictand is the total amount of precipitation of eight selected stations. 2) Predictor are the longitude, the air pressure of typhoon center at 30°N and radius of 1000-mb isobar. 3) Track of typhoons generally fall into several types and each type is studied in relation to rainfall amount *Subject Headings:* **1. Typhoon rainfall forecasting 2. Precipitation forecasting 3. Typhoon effect on forecasting 4. Kanto District, Japan.**—*Author's abstract.*

8E–38 551.509.324:551.578.

Thompson, C. E., **The problem of hailstorm forecasting for Alberta.** *Canada. Meteorologica Division, Circular* 2804, Aug. 1, **1956.** 34 p. 13 figs., 7 tables, 18 refs. **DLC**—A short review o the formation of hail, and of its occurrence in the United States, is followed by similar informatio for Alberta. The destructive hailstorms of the 1954 season in Alberta are studied with attentio to temperature and humidity, frontal analysis, upper-air winds and temperatures, stability character istics, associated precipitation and average tracks. The particular case of July 20, 1954, is examine in detail. *Subject Headings:* **1. Hailstorm forecasting 2. Alberta, Canada.**—*From author's abstrac*

8E–39 551.509.324:517.512.2(52

Tsuruoka, B., **Forecasting of precipitable days by periodogram analysis.** *Journal of Meteoro logical Research*, 3(9):322, July **1951.** fig. In Japanese. **DWB**—Japanese observations fro 1930–1950 subjected to periodogram analysis and calculated curve compared with observed. *Subje Headings:* **1. Precipitation forecasting 2. Periodogram analysis 3. Japan.**—*M.R.*

8E–40 551.509.324:551.577.36(492

*Visser, Barend, **Toepassing van de kansberekening op den regenval met het oog op polde bemaling.** [Calculation of probabilities applied to rainfall data with respect to polder drainin Leiden, Eduard Ijdo, **1947.** 196 p. diagrs., tables, eqs. Thesis (Dr. of Technical Science)– Technische Hoogeschool, Delft, 1947. English summary, p. 137–138. **DLC**—An elaborate st tistical study of the daily rainfall amounts for 50 years (1890–1939) at Boskoop, Leeghwater an Hoorn in the Netherlands to determine the future probabilities of rainfall for designing the capacit of proposed draining mills for the polder areas. The rainfall amounts were classified into 6 group (0 rainfall being a 7th group). It was found that (1) days with >5 mm rainfall are not independen of days with <5 mm, (2) periods with more than 1 rainy day are independent of periods with one da of <5 mm, and (3) the distribution of rain amounts during periods of rainy days of >5 mm a independent so the amounts on any given day in the same month (regardless of whether it is th 1st, 2nd or 3rd . . . rainy day, should be equal. Actual data and significance test tables are ap pended. *Subject Headings:* **1. Rainfall probability 2. Statistical studies of rainfall 3. Rainfa duration-intensity probability 4. Polder drainage mills 5. Netherlands.**—*M.R.*

8E–41 551.509.324(522)

Yamada, S., **Objective forecasting of rainfall in Kyushu.** *Journal of Meteorological Research,* okyo, 8(2):110–118, March **1956.** fig., tables, 8 refs. In Japanese. **DWB, DLC**—A long paper, ıtirely in Japanese, giving scatter diagrams and nomograms for predicting rainfall amounts from ynoptic and vertical velocity patterns, for a number of places in Japan. The work is based on ethods of Riehl et al. (1952), Bellamy (1949) Thompson and Collins (1953) and others. *Subject eadings:* **1. Rainfall forecasting 2. Objective forecasting.**—*M.R.*

## SNOW MELT, RUNOFF, WATER SUPPLY

8E–42 551.509.5:551.579

Błyskowski, Antoni, **Zagadnienie prognozy hydrologicznej i meteorologicznej w gospodarce odnej.** [The problems of hydrological and meteorological forecast in water economy.] *Przegląd leteorologiczny i Hydrologiczny,* Warsaw, 6(3/4): 80–82, **1953. DWB**—A theoretical paper discussing mainly the shortcomings of hydrological forecasting and explaining them by a fallacious tendency hydrologists to shun analyzing phenomena of nature and be satisfied with simple registration nd classification of observed phenomena without linking them to the surrounding environment. ydrological forecasting established on basis of precipitation data from the basin is based on the etermination of the dependence between rainfall and the ensuing water discharge in the river bed. he main factor of the magnitude of the surface runoff is the intensity of the rain, whereby the volume discharge is directly proportional to precipitation intensity. Several days forecasting by means reporting the water levels often gives poor results as it does not consider the individual waves and e reciprocal effect of waves in the river bed. Analyses of wave speed in regard to the movement air masses should be attempted in investigations of atmospheric processes. The irregularity of ovement of air mass levels is the result of physiographic, stable conditions, and, on the other hand, varying conditions. However, the diversity of varying conditions occurs often as a result of etermined laws and has the features of continuously reiterating phenomena, although of varying rce. Nevertheless, this periodicity does not denote a simple recurrence of identical phenomena. esults of investigations contradict the idea of the 11-year periodicity connected with sunspot tivity. There appears, rather, a 13-year periodicity confirmed by comparison of lowest water vels, by smallest variations in mean river discharges and rainfalls, as well as the recurrence of haracteristic years in that period. The two last years (1952 and 1953) are, in general, analogous ith 1939 and 1940, as well as with 1926 and 1927. On this basis the year 1954 may be characterized a year poor in water, in the same manner as the years 1941 and 1923. *Subject Headings:* **1. Hydologic forecasting 2. Water conservation.**—*A.M.P.*

8E–43 551.509.5:551.579.4

Chomicz, Kazimierz, **La prévision des crues de la fonte des neiges.** [Flood forecasting from ow melt.] *Acta Geophysica Polonica,* Warsaw, 2(2):59–72, **1954.** 5 refs., eqs. In French. olish summary p. 71–72. **DWB, DLC**—A paper discussing the forecasting of the level of waters ising from the melting of the snow is presented. It boils down to the determination of two major ements: 1. The reserve of water in the snow directly before the beginning of the melting and 2. The velopment of the process of snow melting and the conditions of runoff. The paper presents the llowing conclusions: 1. Precise data on the thickness of the snow cover and the density of the snow e indispensable for accurate forecasting. 2. Precise investigation of morphological elements of the sins, for the determination of active surfaces of the main profiles, should be carried out. 3. Some naller basins with varying hydrological conditions should be selected for the study of the process d conditions of discharge of snow water and for the determination of the coefficient of runoff as a nction of water reserve in the snow, the degree of freezing of the ground and the intensity and ration of the thawing. *Subject Headings:* **1. Flood forecasting 2. Snow melt runoff.**—*A.M.P.*

8E–44 551.509.5:551.579:551.578.46

Henderson, Thomas J. (*Calif. Elec. Power Co., Bishop*), **Use of aerial photographs of snow depth arkers in water supply forecasting.** *Western Snow Conference, 21st, Boise, Idaho, April 1953.* 44–47. 4 figs. **DWB**—Several dozen snow markers (length about 20′ with metal plates at 2′ ervals) were set in 2–3 feet of concrete and rock above the 10,000′ level. Results of measurements ade from airplanes show a good correlation with snow courses and accumulated precipitation. *bject Headings:* **1. Snow surveys 2. Aerial photography 3. Water supply forecasting 4. Calirnia.**—*A.A.*

8E–45 551.509.5:551.579.2(52)

Higashi, Akira; Higuchi, Keiji and Itagaki, Kazuhiko, (*all, Hokkaido Univ.*), **Snow survey in e Lake Shikaribetsu Basin.** *Sapporo, Japan. Hokkaido University. Faculty of Science, Geo-*

:qs. In Japanese;
*physical Bulletin*, 4:65–79, March **1956.** 3 figs., 5 photos., chart, 8 tables, su basin (including English summary p. 78–79. **DWB**—From a snow survey in the Lake Shikari the spring of 1954. precipitation measurements) the rise of the Lake's water level was estimated f the facts that the The discrepancy between the predicted and actual water level is attributed he Chūbetsu river runoff coefficient (47%) was much lower than that found by the authors in **runoff 2. Lake** basin, and precipitation was abnormally low. *Subject Headings:* **1. Snow m Shikaribetsu, Japan.**—*G.T.*

**8E–46** 51.509.5:551.579
**1 Hochsommer**

Hoffmann, Alfred (*Bad Kissingen*), **Sparsame Wasserbewirtschaftung** 331, July 1952 [Economical utilization of water during midsummer.] *Wasserwirtschaft*, 42 (1Kissingen, warns **DLC**—The author, a German specialist for long range weather forecasting in Bacbility of a warm in June 1952 that a series of factors (sunspots, similar years etc.) indicate the poswater. *Subjec* and dry sum mer during 1952 in Central Europe and suggests an economical use c *Headings:* **1. Water supply forecasting 2. Central Europe.**—*A.A.*

**8E–47** 09.5:551.579.2
**55h-off forecasts**

Houston, Clyde E. and Work, Robert A. (*U. S. Soil Conservation Service*), **R** 8, May **1953 1953 water supply in the West.** *Western Construction*, San Francisco, 28(5):754. . . . *Ibid.* fig., graph, photo, ports. Also: Houston, C. E. and Stockwell, Homer J., . . . 1 of 1953 show 29(5), May **1954.** 5 p. photos, diagrs. **DLC**—Snow surveys in Southwest in sprirada, Arizona that a severe water shortage threatens New Mexico, Southern Utah and parts of Nhreatening in and Colorado. Shortages due to deficit in soil from previous year's drought are also acific North- British Columbia and there is a lack of margin for the same reason in the rest of the histograms west. Prospective stream flow shown on chart of Western U. S. and state by state show meage comparing 1953 storage with 1941–50 storage. In 1954 surveys of Western snowpack Northwest supply in Southwest, virtual drought in New Mexico and Colorado and good margin i in drought reservoir storage generally above past 10-yr. average at start of spring runoff, excep4.) *Subjec* areas. (For 1951 forecast *see* 2.9 145, Sept. 1951, *MAB*; for 1955 forecast, *see* 8E–**ern U. S.**— *Headings:* **1. Runoff forecasts 2. Water supply forecasting 3. Snow surveys 4. Wes** *M.R. and authors' abstract.*

**8E–48** :551.578.4
551.509.58:551.579.**w melting**

Ishihara, Kenji and Fukuhara, Kozo, **Studies on forecasting of floods due to sno** Ishihara *Seppyo* (*Snow and Ice*), Tokyo, 12(4):135–145, **1951.** figs., tables. In Japanese. Al*id.*, 15(4) Kenji and Fukui, Atsushi: **Studies on the forecasting of floods due to snow-melting.** *Il* the fore 1–10, March **1954.** 16 figs., 5 tables. In Japanese. **DWB, DLC**—The authors studie the heat casting of the magnitude of snow-melting in the Uonogawa Basin from the standpoint otant role economy within the layer of snow cover. The following four factors play a most imporom snov (1) radiation from the sky, (2) conduction of heat from the air to the layer, (3) radiation frecastin cover itself, and (4) release of latent heat of melting from the snow layer. Based on the run-off t of the magnitude of snowmelting, they concluded they could predict the magnitude of *Irakawa* some extent. *Subject Headings:* **1. Snow melt forecasting 2. Uonogawa Basin, Japan.**—*H.*

**8E–49** 51.579.
551.509.33:5:ological

Ishihara, K. and Fukui, A., **A study on snow melt flood forecasting.** *Journal of Meteo*mmar *Research*, Tokyo, 4(11):821–835, Feb. **1953.** 17 figs., 4 tables. In Japanese. English sul wate p. 51–52. **DWB, DLC**—From 3 snow surveys in drainage area of Uono R. 1951, equivalenscribe was computed and adjusted to Feb. 21, March 13 and 28. Methods of calculation are fully dels bas with diagrams. Total snow melt Feb. 21–March 28 is compared with total discharge min snov flow = runoff Feb. 22 March 29. An expression is derived for computing daily runoff from**astin** melt on 5 preceding days which gave good agreement. *Subject Headings:* **1. Snow melt forec 2. Japan.**—*C.E.P.B.*

**8E–50** 579.
551.509.5:551**tesé**

Kalinin, G. P. and Makarova, T. T. (*Moscow*), **A hóolvadás során előálló lefolyási vesz me kiszámítása és a tavaszi lefolyás mennyiségének előrejelzése.** [Determination of snow 195 runoff and forecasting of runoff for spring.] *Időőárás*, Budapest, 60(1):1–11, Jan./Feb. orde 5 figs., table, 11 refs., 14 eqs. English summary p. 1. Text in Russian p. I–VII. **DLC**—In cola to determine water losses during the melting season, a correlation is sought between runoff, per y a tion, soil saturation and depth of soil freezing. The application of the method is illustrated b ve example from the Oka river basin, and verified by five other river basins. Estimated and obser se values are shown to be in agreement apart from minor discrepancies attributable to different cau *Subject Headings:* **1. Runoff forecasting 2. Snow melt runoff 3. U.S.S.R.**—*Authors' abstract.*

**8E–51** 551.509.5:551.579.2:551.524.1

Koelzer, Victor A. and Ford, Perry M., **Effect of various hydroclimatic factors on snowmelt runoff.** *American Geophysical Union, Transactions,* 37(5):578–587, Oct. **1956.** fig., 3 refs., eqs. **DWB, DLC**—The influence of various climatic factors on snowmelt runoff was determined through 583 multiple correlations for streams in a Bureau of Reclamation multiple-purpose reservoir system located in northern Colorado and southeastern Wyoming. The use of high-speed electronic computers facilitated the solution of the equations and the determination of various statistical parameters considered indicative of accuracy. The superiority of using both precipitation and snow-survey data as primary factors was indicated. Other factors, including winter and spring temperature and melt-season precipitation, were found helpful in individual cases, but not uniformly. Investigations of factors antecedent to the snow-accumulation period revealed no significant increase in accuracy. Numerous investigations were also made of different methods of weighting the primary factors. *Subject Headings:* **1. Runoff forecasting 2. Snow melt runoff 3. Computation of correlation coefficients.**—*Authors' abstract.*

**8E–52** 551.509.5:551.579

McDonald, C. C. (*U. S. Geological Survey, Tacoma, Wash.*), **Use of base flow in forecasting runoff during the non-flood season.** *Western Snow Conference, 21st, Boise, Idaho, April 1953,* p. 53–56. 4 figs., table. **DWB**—Runoff for July to Sept. in the Salmon River was correlated with the base flow using the depletion curve and considering the precipitation during these three months. Multiple correlation coefficient .98. Basic data are presented for 25 years. *Subject Headings:* **1. Summer runoff forecasting 2. Depletion curves 3. Salmon River, Idaho.**—*A.A.*

**8E–53** 551.509.5:551.579

*Nelson, M. W. (*Soil Cons. Ser., Boise*), McDonald, C. C. (*U. S. Geological Survey, Tacoma, Wash.*) and Barton M. (*Soil Cons. Ser., Medford, Ore.*), **Base flow as a parameter in forecasting the April–June runoff.** *Western Snow Conference, 21st, Boise, Idaho, April 1953,* p. 61–66; **Discussion** by Willard W. Dean, p. 67–68. 3 tables, eqs. **DWB**—The base flow as of Nov. 1 or of Feb. 1 was used as an index for soil moisture deficiency, which must be replenished during the snow melting period. Basic data are given for 4 catchment areas in the Columbia River basin. In each case the correlation coefficients between snow water content and runoff were increased by the addition of the base flow factor. *Subject Headings:* **1. Base flow 2. Snow melt runoff 3. Runoff forecasting 4. Columbia River Basin. I. Dean, Willard W.**—*A.A.*

**8E–54** 551.509.5:551.579

Nelson, M. W.; Wilm, H. G. and Work, R. A., **Soil priming in relation to snow surveys and flood regulation.** *American Geophysical Union, Transactions,* 34(2):240–248, April **1953.** 6 figs., 5 tables, 2 refs. Shorter version issued in *Western Snow Conference, 20th, Sacramento, Calif., April 1952, Proceedings,* p. 10. **DWB**—In earlier analyses of techniques for water forecasting in the Columbia River Basin, both water yields and flood discharges were found to be highly correlated with the water content of snow as determined by snow surveys, and with the amount of precipitation which occurred during the spring. Studies described in this paper demonstrate the additional correlation obtained by including data on autumn precipitation in the forecast analyses. Recorded for the autumn preceding each spring flood, these data express the degree of "soil priming" in the Basin—the extent to which autumn deficits in soil moisture are replenished by precipitation before the snow pack accumulates each winter. Data on this variable were included in a linear multiple regression equation, with snow water content and spring precipitation as the other independent variables. As compared to previous analyses, the inclusion of the soil-priming variable made a 40% improvement in the standard error of the forecasts, made on April 1 of each year. Smaller improvements in precision were observed for later forecasts, made on May 1 and May 15. *Subject Headings:* **1. Hydrologic forecasting 2. Soil moisture.**—*Authors' abstract.*

**8E–55** 551.509.5:551.579.1

Nezhikhovskiĭ, P. A., **Opyt raboty po prognozam poleznogo pritoka v vodokhranilishcha severo-zapada Evropeiskoi territorii SSSR.** [Experience in the forecasting of utilizable inflow into the water reservoirs of the north-western territory of USSR.] *Meteorologiia i Gidrologiia,* No. 6:41–42, **1952.** 4 eqs. **DLC**—Some theoretical considerations based on experience of work of the Leningrad Hydrometeorological Service. For large reservoirs (over 8–10% of basin) the author recommends separate computation and forecasting of the usual inflow, of inflow from precipitation and of evaporation. The methods of inflow forecasting applied to small reservoirs (less than 200–300 km²) are not much different from usual methods of river runoff forecasting. *Subject Headings:* **1. Water supply forecasting 2. Leningrad Hydro-meteorological Service.**—*N.T.Zikeev.*

8E–56 551.509.5:551.579:551.578.46

*Polos, Anthony J. (*U. S. Weather Bur., Portland, Ore.*), **The use of precipitation and snow survey data in water supply forecasting.** *Western Snow Conference, 21st, Boise, Idaho, April 1953,* p. 30–34; Discussion by Clarence Pederson, p. 34–35. 3 figs., table, ref. **DWB**—If the true accumulated precipitation over a catchment area is not known, the precipitation and snow survey data at selected places can be used as an index for stream flow forecasting with good results. The author correlates such runoff for the Clearwater River. *Subject Headings:* **1. Snow melt runoff 2. Water supply forecasting 3. Snow data 4. Clearwater River, Idaho. I. Pederson, Clarence.**—*A.A.*

8E–57 551.509.5:551.579.5

Rorabaugh, M. I., **Prediction of ground-water levels on basis of rainfall and temperature correlations.** *American Geophysical Union, Transactions,* 37(4):436–441, Aug. **1956.** 8 figs., 3 refs. **DWB, DLC**—A method for predicting ground-water levels in the glacial-outwash deposits in the Ohio River valley near Louisville involves development of curves by graphical correlation to define the effects of winter precipitation and winter temperature on recharge to the water table, and to determine the decline of the water table as water leaks into the Ohio River. Recharge occurs in the winter when evaporation and transpiration are at a minimum and when the soil is at or near field capacity. Several months are required for the water to percolate through about 60 feet of alluvium to reach the water table. *Subject Headings:* **1. Ground water level forecasting 2. Ohio Valley.**—*Author's abstract.*

8E–58 551.509.5:551.579

Serra, L., **Les études hydrologiques sur la Houte-Durance.** [Hydrologic studies on the upper Durance.] *La Houille Blanche,* 8(B):725–734, Nov. **1953.** 4 figs., 2 charts. **DLC**—A precipitation and snowfall measurement network established around the upper basin of the Durance river is described; the usefulness of such a dense network for hydrologic forecasting is explained. The network comprises pluviographs and radioactive snow gages. Temperature and wind are also measured. A study of precipitation and corresponding runoff data will help establish relationships between the two parameters and facilitate hydrologic forecasts. *Subject Headings:* **1. Hydrologic forecasting 2. Precipitation networks 3. Runoff data 4. Durance River, France.**—*G.T.*

8E–59 551.509.5:551.579

*Summersett, John (*U. S. Engineers, Walla Walla, Wash.*), **Reproduction of snowmelt floods in the Boise River.** *Western Snow Conference, 21st, Boise, Idaho, April 1953,* p. 36–43. 5 figs. **DWB**—Shows how to average water equivalents of snow courses in order to obtain means for the whole catchment on a given date. The method is based on the area-elevation curve and the relation of snow water content to height. The snowmelt is computed currently by finding first the equivalent area contributing at the maximum melt rate. Considering the water losses, the resulting runoff can be forecast several days in advance. *Subject Headings:* **1. Snowmelt floods 2. Runoff forecasting 3. Boise River, Idaho.**—*A.A.*

8E–60 551.509.5:551.579

Szesztay, Károly, **Belvízmennyiségek meghatározása és előrejelzése csapadékból: módszertani tanulmány.** [Determination and forecasting of runoff on lowland areas from precipitation: a methodological study.] *Vízügyi Közlemények,* Budapest, No. 2:215–229, **1956.** 5 figs., 2 tables, 17 refs. English and German summaries p. 30–31. **DWB**—A method is developed for predicting surface water conditions in level areas with limited runoff. The factors considered are water supply (precipitation and snowmelt), ground water conditions (as determined from preceding precipitation conditions) and freezing of the soil. Data on 22 surface-water periods (limited runoff periods) in the drainage area of the pumping plant at Peres, Hungary, are tabulated and their correlations analyzed graphically. *Subject Headings:* **1. Runoff forecasting 2. Peres, Hungary.**—*G.T.*

8E–61 551.509.5:551.579

Tryselius, O. (*Met. and Hydr. Inst. of Sweden*), **Forecasting runoff in Sweden.** *I.U.G.G. Association of Scientific Hydrology, Brussels,* 1951, [*Transactions*], 3:237–239, **1952. DWB**—General report on experience with runoff forecasts, made mainly for the total discharge during springtime floods, resulting from snow melt. Sample forecast for Lake Torrón discussed. *Subject Headings:* **1. Snow melt floods 2. Runoff forecasting 3. Sweden.**—*A.A.*

8E–62 551.509.58:551.579.2

U. S. Corps of Engineers, **An empirical method of forecasting critical snowmelt inflows to pine flat reservoir.** Its *Snow Investigations, Research Note,* Dec. 24, **1952.** 11 p. 4 plates in 7 sections (fold.). **DWB**—Springtime flood runoff resulting from snow melt over the Kings River Basin in

California studied. The finally adopted regression equation forecasting the discharge above a recession flow include the number of days after the average "have date" at selected stations, temperature for the preceding day and temperature degree-days since the average "have date". Correlation coefficient 0.64. *Subject Headings:* **1. Flood forecasting 2. Snowmelt floods 3. King River, California.**—*A.A.*

**8E–63** 551.509.5:551.579

*U. S. Corps of Engineers. **Forecasting seasonal runoff by the water-balance method.** Its *Snow Investigations, Research Note,* No. 22, Sept. 30, **1954.** 4 tables, 4 plates (fold.), 23 refs., eqs. **DWB**—Provided that adequate data are available for a given basin, runoff during a given period may be forecast by a water-balance method which evaluates each of the various components; rainfall, snowfall, loss, and snow water-equivalent on the ground. Application of the method to the North Santiam River Basin above Detroit, Oregon, indicates that satisfactory results are obtainable even where hydrologic records are too short to provide an adequate number of samples for derivation of forecast procedures by statistical analysis. The water-balance method is adaptable to use of either forecast, assumed, or normal conditions during the forecast period and permits easy revision of the runoff forecast where necessitated by occurrence of unexpected conditions. *Subject Headings:* **1. Runoff forecasting 2. Forecasting techniques 3. Hydrologic cycle.**—*Author's abstract.*

**8E–64** 551.509.5:551.579.2

U. S. Soil Conservation Service et al., **Snow run-off forecasts: 1955's water supply in the West. 1955.** (4 p.) photos, figs. **DWB**—Map of Western U. S. based on March 1955 data showing prospective stream flow for April–Sept. 1955 in terms of percentage of 1943–1952 average shows serious deficiency in available water in Arizona and New Mexico (<20% in South and Central portions) and shortages in all SW states, South Idaho and Wyoming and even Eastern Oregon and Washington. Adequate storage and snow pack is found only in Western Washington and Oregon and NW Montana and British Columbia. State by state summaries are included in report. (For earlier forecasts *see* 8E–47.) *Subject Headings:* **1. Runoff forecasts 2. Water supply forecasting 3. Snow surveys 4. Western United States.**—*M.R.*

**8E–65** 551.509.5:551.579:628:06

Upper Missouri River Water Forecast Committee, **Minutes of the 7th annual meeting, Billings, Montana, April 11, 1955.** Ashton R. Codd, general chairman. **1955.** 9 p. tables. **DWB**—The conference was attended by 22 officials of U. S. Weather Bureau, Forest Service, Geological Survey, Soil Conservation Service, Fish & Wild Life Service, etc. The various weather and snow survey data pertinent to runoff during winter, water supply in upper Missouri Basin and future runoff were discussed. A dry hot autumn, with great water loss was compensated in NW and Central Montana by a wet cold spring and a 6 inch snow at the first of April over all of Central Montana. Shortages listed in upper Missouri and ground water levels were lowest in 7 or 8 years. *Subject Headings:* **1. Water supply conferences 2. Hydrologic forecasting 3. Upper Missouri Basin 4. Montana.** —*M.R.*

## FLOOD, RIVER FLOW, RIVER FREEZING

**8E–66** 551.509.58:551.579.4

Apollov, B. A. and Lisachenko, F. P., **Printsipial'nye vozmozhnosti kratkosrochnogo fonovogo prognoza nachala vesennego polovodi'ia na malykh rekakh.** [Principal possibilities of short range forecasting of spring floods for small rivers.] *Leningrad. Tsentral'nyi Institut Prognozov, Trudy,* 2(29):45–64, **1947.** 7 figs., 9 tables, 10 eqs. **DLC**—In spite of the absence of water gage points in small river basins, there is need of forecasting spring floods for the security of people and industries located in these areas. Author discusses the possibility of organizing such a forecast and presents the theory and practical methods of carrying it out. The questions of forecasting; the time of spring flood onset, depending on temperature rise and snow density, the statistical methods of determination; the water level variations during spring floods and the height of spring high water are theoretically and practically discussed on basis of Oka River spring flood data for the period 1933–1940. *Subject Headings:* **1. Flood forecasting 2. Spring floods 3. Oka River, U.S.S.R.** —*A.M.P.*

**8E–67** 551.509.58:551.579.4(432.2)

Böer, Wolfgang (*Weimar*), **Das Frühjahrshochwasser 1947 in Thüringen.** [Spring floods of 1947 in Thuringia.] *Weimar. Thüringische Landeswetterwarte, Mitteilungen,* No. 8:59–88, **1949.** 11 figs., 7 refs. **DLC**—A detailed study of a single flood resulting from snow melt. The author attempts a theoretical approach considering hydrometric characteristics of the stream channel, "actual" and "effective" precipitation, temperature and snow melt, percolation and evaporation,

but finally adopts the oversimplified practical formula: $\Delta P = (\bar{N} + 6\Delta\bar{h})K$; $\Delta P$ = changes of water level in 24 hrs in percentage of mean monthly variation; $\bar{N}$ = weighted mean precipitation [mm]; $\Delta\bar{h}$ = weighted change of snow height [cm]; $K$ = constant (0.58). Meteorological and hydrological conditions of the 1947 flood described and a classification of flood types dependent on orographical and meteorological conditions attempted. *Subject Headings:* **1. Flood forecasting 2. Spring floods 3. Thuringia, Germany.**—*A.A.*

**8E–68** 551.509.5:551.579

*Church, James E., **Standardizing method of snow cover measurement: ten years comparison of forecasting runoff of the Colorado River (U.S.A.) by snow surveys and measurement of precipitation.** *International Union of Geodesy and Geophysics, Association of Scientific Hydrology, Oslo 1948* [*Transactions*], 2:118–127, [1949?] 4 figs., 3 tables. **DWB**—Forecast methods summarized and illustrated and gages described and shown in photographs. *Subject Headings:* **1. Snow surveys 2. Runoff forecasting 3. Colorado Basin.**—*M.R.*

**8E–69** 551.509.5:551.579.4

Clark, William E., **Forecasting the dry-weather flow of Pond Creek, Oklahoma: a progress report.** *American Geophysical Union, Transactions*, 37(4):442 450, Aug. **1956.** 8 figs., 5 refs., 6 eqs. **DWB, DLC**—Pond Creek in west-central Oklahoma drains an area of 319 sq mi above the gaging station near Fort Cobb, Caddo County. Ground water, contained in the Permian Rush Springs sandstone under water-table conditions, moves toward the creek at an almost unchanging rate. The discharge of ground water into the creek as dry-weather flow is modified by evapotranspiration and antecedent overland runoff. Multiple correlations have been computed relating the dry-weather flow to the water level in a well and to a factor indicative of the rate of evapotranspiration. A method for forecasting the factor indicative of evapotranspiration and one for forecasting the water level in the well during dry weather are given; the result is a method for forecasting the dry-weather flow of the Creek. Forecasts of dry-weather flow for seven and 21 days compare favorably with observed flows. The technique may be utilized to extend a forecast for several months. *Subject Headings:* **1. River forecasting 2. Pond Creek, Oklahoma.**—*Author's abstract.*

**8E–70** 551.509.5:551.579(282.243.1)

*Coutagne, A., **Prévisions des débits d'été du Haut-Rhin (Rhin Suisse): analyse des mémoires du Dr. Hoeck (Suisse) et du Dr. Church (Etats-Unis d'Amérique), et commentaires.** [Forecasting the summer runoff in the upper (Swiss) Rhine: review of papers by Dr. Hoeck (Switzerland) and Dr. Church (U.S.A.) and comments.] *La Houille Blanche*, 8(B):702–707, Nov. **1953.** fig., 4 tables, eqs. **DLC**—The principal object of this discussion is a paper by CHURCH on summer runoff forecasting for the upper Rhine (*Nevada Agricultural Experiment Station Research Bulletin*, 1 and 2, **1951, 1952**). Various methods of runoff forecasting from rainfall and snow cover data are considered. Tabulated data show catchment areas of upper Rhine and tributaries, monthly runoff values, number of precipitation stations, average precipitation, precipitation-runoff coefficients and other correlations. *Subject Headings:* **1. Summer runoff forecasting 2. Upper Rhine River, Switzerland.** —*G.T.*

**8E–71** 551.509.5:551.579(788)

*Debler, E. B. and Johnson, A. F., **Forecasting Colorado River runoff.** [Wash., D. C., U. S. Dept. of the Interior, Bureau of Reclamation], May **1935.** 49 p. 11 tables, 9 graphs. Photostat of typescript. **DWB**—Forecasting of Colorado River flood flows is essential in operating the Boulder Reservoir and power plant at best efficiency in coordinating flood control, power production and water conservation. A study has been made of the relative accuracy of predicting flood runoff from accumulated winter precipitation and from snow depths. The available precipitation data are faulty in that the stations operated have been few in number and poorly distributed, with far too few above elevation 8000, where most of the water is produced. The snow data are also faulty in that there is a very poor distribution of stations and most of them are snow stakes with snow depth measured and water content estimated. The results of the studies indicate that snow stake depths as of March 31, are undependable as a basis for forecasting as they show a mean departure of actual runoff from the estimate of 26.4%. The mean departure obtained with estimates based upon October to March accumulated precipitation is 17%. For earlier estimates the snow stake method appears even less desirable. It has been concluded that with added precipitation stations strategically located, the mean error in forecasts can be reduced to an average of 12%. Snow course surveys, consisting of strings of individual observations of snow depth and water content conducted on Logan River and above Jackson Lake on Snake River show a mean error of about 10% and an equal accuracy could probably be secured on Colorado River. A study of the costs of the precipitation and of operation of precipitation stations is considerably less than for snow surveys, but that the

reater accuracy of snow surveys may possibly warrant the additional cost. In order to compare he two methods under identical conditions, it is proposed to add 12 new precipitation stations in he Colorado River watershed above Palisade to cover that area adequately and to establish 17 now courses therein to be surveyed during March and again in April with earlier surveys at four ey courses. To improve the accuracy of predicting runoff from the balance of the watershed bove Boulder Dam, 28 additional new precipitation stations are proposed to supplement existing tations. The cost of this activity is estimated at $7100 for installation, and $6500 annually for peration. It is expected that cooperation can be secured in a large measure so that these costs ould not fall wholly on the Bureau. *Subject Headings:* **1. Runoff forecasting 2. Forecast improvement 3. Precipitation networks 4. Colorado River.**—*Authors' abstract.*

**8E–72** 551.509.58:551.579.4

Fekete, P. H. (*Univ. of Technology, N.S.W.*), **Development of unit hydrographs under Australian onditions.** *Institution of Engineers (of) Australia, Sydney, Journal,* 26(10/11):234–238, Oct./Nov. **954.** 4 figs., table, 5 refs. **DLC**—This paper first explains the unitgraph method of flood estimation nd then investigates the possibilities of its use in New South Wales under existing conditions of ydrometric data collection. An example of a flood hydrograph for a N.S.W. catchment obtained y the unitgraph method is given. Some recommendations are made as to its use in Australia. *ubject Headings:* **1. Flood forecasting 2. Unit hydrographs 3. New South Wales.**—*Author's bstract.*

**8E–73** 551.509.58:551.579.4

Fontaine, P., **Application aux crues de la Seine, notamment celles de janvier et février 1955, 'une méthode d'investigation des bassins fluviaux en état de réagir à de nouvelles précipitations.** A method of investigating river basins in which the river reacts to renewed rainfall, applied to the eine floods, and in particular to those which occurred in January and February 1955.] *Société Hydrotechnique de France, Mémoires et Travaux,* 2(2):117–122, **1955.** 2 figs., 2 tables. **DWB.** lso in: *La Houille Blanche.* Grenoble, Vol. 10, Special No. B:613–618, Sept. **1956. DLC**—Simple riteria were sought which would make it possible to detect in good time the river basins likely to eact to renewed rainfall. These criteria have been established as a function of a curve for each asin representing mean precipitation over ten-day periods, and of the corresponding "normal" ainfall; they have a particular significance for the "pluvial oceanic" types of flow regime. By neans of examples relating to the Seine catchment area, this method is shown to be adequate for redicting, in the winter, with sufficient accuracy, the dates and magnitude of floods likely to occur n Paris. *Subject Headings:* **1. Flood forecasting 2. Seine floods (1955) 3. Seine River, France.**—*uthor's abstract.*

**8E–74** 551.509.58:551.579.4

Fontaine, P., **Contribution de la météorologie au problème de l'annonce des crues et de leur omportement.** [Contribution of meteorology to the problem of warnings of floods and their ehavior.] *La Météorologie,* Paris, Ser. 4, No. 37:45–61, Jan./March **1955.** 10 figs. English and talian summaries p. 45. Also: Bessemoulin, J., **Le problème de l'annonce des crues.** [Problem f flood warning.] *Ibid.,* p. 77–78. **DWB**—The contribution of meteorology in these cases should nvolve the transmission of weather forecasts which would enable the administration of the Ponts t Chaussées to supplement the actual river flow data with the additional flow due to the predicted recipitation and snow melt. A new method of determining when river basins will flood under the ffect of new rainfall is presented and described. This method, based upon comparison of preipitation amounts for 10 days and of the corresponding normals, shows that the 2N and 3N values epresent, respectively, the alert stage and the probable flood stage. A more subtle use of the method an be obtained by examining: a) the previous rate of rainfall over a long period (state of saturation f soil); b) temperature variations with height (retention and melting of snow); c) mean monthly oefficients of river discharges.—Bessemoulin comments favorably on Fontaine's work and also nentions the paper "A simple index of drought conditions" by J. McQuigg, *Weatherwise,* June 1954 *see* 6.2–262, Feb. 1955, *MAB*) which, although opposite in its purpose (as it concerns prediction f drought conditions) shows similarities to Fontaine's paper, both methods being simple and ffective. *Subject Headings:* **1. Flood forecasting 2. Flood warnings 3. Drought forecasting. . McQuigg, J.**—*A.M.P.*

**8E–75** 551.509.5:551.579

Fry, Albert S., **Recent developments in hydrology with respect to stream flow forecasting.** *.U.G.G. Association of Scientific Hydrology, Oslo, 1948* [*Transactions*], 1:143–151, [1950?] 11 refs. **DWB**—General information on observation and forecasting methods developed for the Tennessee Valley Authority. A great number of radio rain and stream gages, partly with automatic tape ecording, were established for inaccessable regions. The main forecasting tools are the unit hy-

drograph, index areas, recession curves, estimation of infiltration, etc. Extensive studies were made on the influence of vegetal cover on floods. The close cooperation with the U. S. Weather Bureau greatly increased the accuracy of hydrological forecasts. *Subject Headings:* **1. Hydrologic forecasting 2. Hydrologic studies 3. Flood forecasting 4. Tennessee Valley Authority.**—*A.A.*

**8E–76** 551.509.5:551.579

Fulcher, Martin K. (*U. S. Bur. of Reclamation, Boulder City, Nevada*), **An approach to stream flow forecasting.** *Western Snow Conference*, 21st, *Boise, Idaho, April* 1953, p. 18–23. 5 tables, 2 figs., 2 refs. **DWB**—Gives a multiple regression equation for the forecast of April through July runoff in the Green River above Linwood, using fall and winter precipitation and winter temperature excess above freezing as independent variables. Final correlation is .918. *Subject Headings:* **1. Runoff forecasting 2. Snow melt runoff 3. Green River, Wyoming.**—*A.A.*

**8E–77** 551.509.5:551.579

*Hoeck, E. (*Lab. de Recherches Hydrauliques et de Mécanique des Terres, Zurich*), **Prévision du débit estival de quelques rivières suisses par la méthode de correlation à plusieurs variables.** [Forecasting the summer flow of some Swiss rivers by the method of correlation of several variables.] *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], 3:262–274, **1952.** 10 figs., 4 tables. **DWB**—A detailed report on the forecasting of summer runoff in five Swiss catchment areas, based on two approaches: a) computing the water reserves in the snow cover, the lakes and groundwater for the first of April; b) using meteorological and hydrological data (precipitation, runoff, etc.) for the preceding winter. In most cases the method of multiple correlation was applied. The snow cover reserves were computed on the basis of measurements at numerous single stations, utilizing the hypsographic curves for different exposures. Correlation coefficient was 0.85. The second method resulted in correlations from 0.64 to 0.87. Computed and measured runoff data are presented for each year, as well as a map of catchment areas and some data for the annual water balance of the river basins. *Subject Headings:* **1. Runoff forecasting 2. Snow melt runoff 3. Hydrologic cycle 4. Switzerland.**—*A.A.*

**8E–78** 551.509.58:551.579.4(52)

Iwasaki, T.; Sasaki, T., and Kadowaki, T., **On the flood forecasting in the downstream of the River Kitakami.** *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Meteorological Society for Research of Tohoku District*, 6(1):50–53, Nov. **1951.** 7 figs., table. In Japanese; English summary p. 251.—The results reported in this paper are as follows. Flood in the downstream of the river Kitakami is more influenced by rainfall in the upstream of Eai and Hasama (branches of the Kitakami in Miyagi Prefecture) than in that of the Kitakami in Iwate Prefecture. When rainfall in the upstream of Eai and Hasama is over 250 mm, water level in the downstream of the Kitakami rises to a dangerous level. Of late the maximum level of the Kitakami has a tendency to increase year by year which indicates an increase in rainfall. *Subject Headings:* **1. Flood forecasting 2. Japan.**—*From authors' abstract.*

**8E–79** 551.509.59:536.421:546.212

Kallós, Mrs. Imré, **A folyók befagyása és az időjárás.** [Freezing of rivers and the weather.] *Időjárás*, 57(1):50–51, Jan./Feb. **1953. DLC**—Popular article stressing the importance of cooperation between meteorological and hydrological services, a fact whose importance was recognized early in the Soviet Union. The problem of freezing conditions is discussed briefly. Pagava's synoptic method of forecasting freezing time is described. *Subject Headings:* **1. Freezing of rivers 2. Forecasting freezing weather.**—*G.T.*

**8E–80** 551.509.5:551.579.4

**Kansas City flood center gets new equipment.** *International Engineer*, Wash., D. C., 98(8):9, Aug. **1955. DLC**—The accurate forecasting of the great flood which devastated the lower Kansas City industrial area in 1951 was hampered by lack of communications from the heavy rainfall and flood areas upstream. This situation has been partly alleviated by installation of radar to observe heavy cloud and precipitation areas, electronic flood routing machines, and cooperation of radio amateurs in area in case the regular communications are disrupted. *Subject Heading:* **1. Flood forecast centers.**—*M.R.*

**8E–81** 551.509.58:551.579

Kohler, Max A. (*U. S. W. B., Wash., D. C.*), **River and water-supply forecasting.** *New York Academy of Sciences, Transactions*, Ser. 2, 18(8):732–745, June **1956.** 10 figs., 5 refs., 4 eqs. **DLC**—The latest river forecasting methods used by the U. S. Weather Bureau are outlined in some detail, with sample hydrographs, nomograms, etc., used in determining antecedent precipitation index, runoff relation, basin recharge relation, coaxial routing relation, derivation of inflow graph from

ffective rainfall, and water supply forecast relation. Forecasts and warnings are now issued for ore than 1000 places in the U.S.A., and water supply forecasts for 350 points in the West for each onth from Jan. through May. Improvements in network and in analysis by use of radar are xpected in near future. *Subject Headings:* **1. River forecasting 2. Flood forecasting 3. Water upply forecasting 4. U. S. Weather Bureau River Forecasting Service.**—*M.R.*

**8E–82** 551.509.5:551.579

Kramer, Harry A. (*Gen. Elec. Corp., Richland, Wash.*), **Historical record of the use of snow over forecasts in the Mid-Columbia area.** *Western Snow Conference, 21st, Boise, Idaho, April 1953,* . 8–11. **DWB**—Account of snow melt flood forecasts, made by the author from 1946 to 1948 or an area at the confluence of the Columbia and Yakima Rivers. Forecasts were very accurate ncluding the catastrophic flood of 1948. *Subject Headings:* **1. Snow melt floods 2. Runoff forecasting 3. Columbia River.**—*A.A.*

**8E–83** 551.509.58:551.579.4

Lambor, Julian, **Możliwośc przewidywania powodzi.** [The possibility of forecasting of floods.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 6(3/4):62–73, **1953.** 3 tables. **DWB**—A efinite differentiation of the various kinds of floods and the different methods of forecasting them s indispensable in order to improve the quality and accuracy of forecasts. A classification of floods ccording to their genesis-criterion and of methods of predicting the corresponding type of flood are herefore introduced and shown in tables. They are floods caused by: 1. Excessive rainfall (downours or prolonged rains); 2. Sudden snow melting; 3. Storms in marginal seas and bays and 4. Ice locking in rivers. Further, the author discusses the peculiarities of development of each flood ype, the weather conditions accompanying them and the best method of predicting each type of ood (long, extended or short range forecast) with a sufficient degree of accuracy. The conclusion—hort and extended range forecasts are most effective; they must also take into consideration neteorological elements leading to the formation of flood conditions. A table showing the periods f occurrence of various flood types is included. *Subject Headings:* **1. Flood forecasting 2. Flood lassification.**—*A.M.P.*

**8E–84** 551.509.58:551.579.4(439.1)

Lászlóffy, Woldemár, **Az árvíz előrejelzése.** [Forecasting of floods.] *Hungary. Vízgazdálkodási Tudományos Rutató Intézet, Vízügyi Közlemények*, No. 1/2:186-203, **1955.** 5 figs., 3 tables. rench summary p. (22–23). **DWB**—Available methods of flood forecasting for the Danube are iscussed, namely (1) forecasts based on river stage reports from upstream stations, (2) the use of recipitation data (such data can only serve as refinements, e.g., in estimating runoff amounts from earby areas), (3) the use of weather forecasts in flood forecasting (weather reports cannot be useully applied to such a purpose at present) and (4) the problem of long-range forecasting in hydrology useful in estimating water resources rather than in predicting floods). The forecasts issued by the Hungarian hydrological service in connection with the major flood of July 1954 are analyzed. *Subject Headings:* **1. Flood forecasting 2. Hungary.**—*G.T.*

**8E–85** 551.509.58:551.579.4:551.578.46

Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, **Atlas maksimal'nykh snegozapasov Evropeiskoĭ chasti SSSR za period 1892–1944 gg.** [Atlas of the maximal snow reserves in the European part of the Soviet Union, 1892–1944.] Leningrad, **1946.** 197 p. almost entirely maps. **DLC**—A fundamental work of basic importance for the forecast of spring floods in the European part of the Soviet Union, which are caused by the melting of snow reserves accumulated during the winter. For each winter for the period 1892–1944 the distribution of the maximal height of snow over is given (maximal average for a decade), based on observations of 1090 stations. The number of stations used for each year varies from 144 (1921) to 347 (1935). Special maps of snow density were prepared for each winter (not published) and the results multiplied with the values of maximal snow height in order to obtain the corresponding water content for a second series of maps which are given for each winter for the period 1904–1944. A third series of maps presents the water content for the maximal snow height of each winter (1904–1944) and the normal water content in order to show departures from the normal geographical distribution. Finally, for each winter for the period 1892–1944 the data of the maximal snow height is shown. The normal distribution of the mentioned values is given on separate maps and a map of stations used for the calculations of the normals is added. A map of normal snow density for the maximal snow height show a central belt with 0.26 southwards from Moscow. The density decreases to 0.23 in the south, 0.24 in the north and 0.20 in west Siberia. *Subject Headings:* **1. Snow cover distribution 2. Flood forecasting 3. Snow density 4. European U.S.S.R. I. Spengler, O. A.** (*ed.*) **II. Sokolova, E. M.** (*comp.*) **III. U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoi Sluzhby.**—*A.A.*

**8E–86** 551.509.58:551.579.4

Lundquist, Roy E. and Fulk, Robert L. (*U. S. W. B., Cincinnati*), **Flood forecasting on the Ohio River directly from rainfall.** *American Meteorological Society, Bulletin*, 34(9):413–419, Nov. **1953.** 10 figs., 5 refs. **DWB**—The history of the Ohio River flood forecasting service, including an elaborate network of reporting stations which date back to the Great January and February 1937 floods in the Ohio Basin, is reviewed, and the detailed procedures used at present in preparing these forecasts or warnings from the river stage reports from the many tributaries, supplemented by rainfall data throughout the basin, outlined. The basis for forecasts is the unit hydrograph. Methods of routing and sample work sheets, rating curves and hydrographs (for flood of April 1948) are included for illustration. *Subject Headings:* **1. Flood forecasting 2. Flood warning networks 3. Unit hydrographs 4. Ohio River Basin.**—*M.R.*

**8E–87** 551.509.58:551.579.4

Masatsuka, Akira, **Study of the flood forecasting in the upper stream.** *Journal of Meteorological Research*, Tokyo, 6(7):245–253, Sept. **1954.** 9 figs., 3 tables, 3 refs. In Japanese; English summary p. 245. **DWB**—The main results of the investigation reported are as follows: 1) Flood in the upper-stream area of the River Sai is most frequent in the "Bai-u" season, i.e., from the middle decade of June to that of July, and frequent in the typhoon season of autumn. Flood due to snow melting is rare in this area in comparison with the lower parts of the river. 2) To select representative stations for the rainfall in the drainage area of the Akashina water gage station, the weather stations at Matsumoto, Shinanozaka and Ōmachi are suitable, among which the first one is most important. 3) A linear relation exists between the logarithms of the rainfall amount observed at the representative points and at other points. 4) The time effect of the rainfall at Matsumoto on the rise of water level at Akashina at a certain hour is investigated, and it is found that a 13-hour duration preceding the time point 5 hours will effect a rise of water level at Akashina. 5) The relation between the rise of water level at Akashina ($\Delta H$) and the amount of rainfall within the effective duration at Matsumoto ($R_{18}$–$R_5$) is given by the formula

$$\log \Delta H = 1.08 \log (R_{18}-R_5) + 0.09.$$

*Subject Headings:* **1. Flood forecasting 2. Flood frequencies 3. Sai River, Japan.**—*Author's abstract*

**8E–88** 551.509.58:551.579.4

Pardé, Maurice, **Prévision géographique des crues extraordinaires.** [Geographical forecasting of unusual floods.] Toulouse, Editions Toulousaines de l'Ingeniéur, Reprint from **Mélanges Géographiques, offerts en hommange à M. Daniel Faucher,** Vol. 1:379–404, [1948?] 6 figs., refs. **DWB**—Three methods of forecasting exceptional floods are outlined and examples given from unusual floods in the U.S.A., France and other countries. The first method is based on probability of certain amounts as determined from coefficients of flow and time of evolution of the flood; the 2nd method on relation between maximum runoff and rainfall (+snow on ground) in basin and the third method based on the Unit Hydrograph method of Sherman and Bernard. All 3 methods are graphical. *Subject Headings:* **1. Flood forecasting techniques 2. Flood probability. I. Bernard, Merril.**—*M.R.*

**8E–89** 551.509.5:551.579

Popova, K. L., **Dolgosrochnyĭ prognoz minimal'nykh raskhodov letneĭ i zimneĭ mezheni na primere r. Moskvy.** [Long range forecasting of minimum discharges in summer and winter, using Moscow River as an example.] *Leningrad. Tsentral'nyi Institut Prognozov, Trudy*, 12(39):3–33 **1949.** 18 figs., 29 refs. **DLC**—Gives a geological and hydrological description of the Moscow River basin, discusses briefly the theoretical basis of long-range runoff forecasting (time lag of runoff infiltration, hydrologic cycle) and gives a series of semiempirical relationships (minimum discharge versus precipitation or versus average discharge in the preceding months or years, etc.). *Subject Headings:* **1. Long range runoff forecasting 2. Minimum discharge forecasting 3. Hydrologic cycle 4. Moscow River, U.S.S.R.**—*A.A.*

**8E–90** 551.509.58:551.579.4

Rafałowski, Stanisław, **Problemy meteorologicznej prognozy powodzi.** [The problems of the meteorological forecasting of floods.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 6(3/4):53–61, **1953.** 2 figs. **DWB**—Methods of forecasting floods vary in dependence on the type of floods which are to be forecast. The author proposes a classification of floods based on the differentiation of causes, discusses the dynamics of and the meteorological conditions favoring their development and outlines the methods of forecasting them. He discusses: 1. Floods caused by the formation of ice blockings on rivers; 2. Floods connected with storms on the sea coast, mainly in river mouths 3. Floods caused by exceptionally abundant rains and 4. Floods connected with rapid melting of the

ow cover. In all above mentioned cases the details of variation of individual processes can be alyzed only in the context of an accurate general long-range forecast. Besides that, almost all enomena require a close analysis in regard to concrete local conditions. *Subject Headings:* **1. Flood recasting 2. Flood classification.**—*A.M.P.*

**8E–91** 551.509.5:551.579

Riggs, H. C. (*U. S. Geological Survey, Raleigh, N. C.*), **A method of forecasting low flow of reams.** *American Geophysical Union, Transactions*, 34(3):427–434, June **1953.** 7 figs., 4 refs. **WB**—The method is essentially based on depletion curves, derived separately for winter and mmer. The increase in base flow due to storms can be computed. Runoff in excess of the depleon curve has to be estimated on the basis of a frequency analysis of storm runoff. *Subject Headings:* **Runoff forecasting 2. Columbia River Basin.**—*A.A.*

**8E–92** 551.509.58:551.579.4(521.7):551.482.3

Saito, S., **On flood forecasting of the river Yodo.** *Journal of Meteorological Research*, Tokyo, 9):601–611, Feb. **1953.** 7 figs., 6 tables. In Japanese; English summary p. (38). **DWB**—The thor investigates the passage of typhoons in connection with heavy rainfall and floods of the Yodo ver. He finds that most floods are caused by typhoons moving northwards from the sea south Honshu, and northwestwards from the Bonin Islands. The characters of these two kinds of phoons are analyzed as to their pressure patterns, total amount of precipitation for Kinki district, d groups of heavy rainfalls. *Subject Headings:* **1. Flood forecasting 2. Yodo River, Japan.**—*om author's abstract.*

**8E–93** 551.509.5:551.579.4:621.311.21

Sapozhnikov, V. I., **Prognoz letnego stoka Volgi u Kuĭbyshevskoĭ GES.** [Forecasting the mmer discharge of the Volga at the Kuibyshev hydroelectric power station.] *Meteorologiia i drologiia*, Leningrad, No. 4:39–42, July/Aug. **1955.** 2 figs., 2 tables, 2 refs., eqs. **DWB**—An uation is developed for forecasting the summer monthly flow of Volga River at the Kyĭbyshev ydroelectric Station. It is

$$\overline{Q}_{n+30} = 0.1545 W_n + 14059 n\overline{h}_2,$$

ere $W_n$ = water reserves in river net at moment of forecasting, $n$, and $h$ are flow and precipitation the center of the basin. An example of the calculation of $h$, for forecasting the monthly flow the Volga at Kuibyshev Hydroelectric Station (1940) and the actual forecast of the monthly flow the Volga at this point are presented. *Subject Headings:* **1. River forecasting 2. Hydroelectric eration 3. Volga River, U.S.S.R.**—*I.L.D.*

**6E–94** 551.509.58(282.26)

Simaika, Y. M. (*Cairo, Egypt*), **The regime of the Nile and the use of forecasts.** (In: United ations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y. **49. Proceedings, v. 4, Water resources,** p. 81–84, **1951.** 3 figs.) **DWB**—A general description the Nile is given. Water level records at Cairo are available from 640 A.D., one of the longest ries of observations of hydrometeorological phenomena. The forecasting methods of the low and e flood stage using hydrological and meteorological elements (water levels, rainfall, temperature d pressure at distant places) are briefly summarized. *Subject Headings:* **1. Water level forecasting Nile River.**—*A.A.*

**8E–95** 551.509.58:551.579.4

Sokolovskiĭ, D. L., **Metodika postroeniia gidrografa livnevogo stoka po osadkam.** [Methods the construction of the hydrograph for runoff considering the precipitation.] *Leningrad. Gosurstvennyĭ Gidrologicheskiĭ Institut, Trudy*, No. 14(68):26–45, **1949.** 13 figs., 5 tables, 10 refs., equations. **DLC**—A detailed study of the problem. A simplified theory for practical use is ven. The maximum and the volume of a flood can be calculated for an uninvestigated basin, owing or assuming the water losses. The distribution of the flood during the time can be calcued, considering the configuration of the catchment area. *Subject Headings:* **1. Flood forecasting Hydrographs 3. Runoff forecasting.**—*A.A.*

**8E–96** 551.509.58:551.579.4(52)

Tajima, S.; Sato, Y.; Takato, T. et al., **On flood forecasting in the upper and middle region the River Abukuma.** *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Meteorical Society for Research of Tohoku District*, 6(1):27–43, Nov. **1951.** 21 figs., 2 tables. In panese; English summary p. 250. **MH-BH.** Also: Sato, Y. and Sekine, Y., **On the flood foresting of the upper and middle regions of the River Abukuma (2nd report).** *Journal of Meteorical Research*, Tokyo, 5(6):431–437, July **1953.** 10 figs. English summary p. 431. **DWB**—In

the first paper a method is described whereby floods are forecast on the basis of rainfall over a basi estimated several hours ahead. The parameters used in predicting rainfall are (1) wind velocit and water vapor content (method for determining these is shown), (2) correlation between rainfall i Kanto or Tokei districts and in the basin investigated, (3) a synoptic classification of precipitatio distribution and (4) estimates of beginning and ending of rainfall with the use of classified isochron types. In the second paper the method is further refined by making the distinction between tw different types of precipitation distribution, one favoring the mountain region, the other showing uniform pattern. Also further parameters are added to those used in the first paper. The resultin flood forecasting diagram is presented. *Subject Headings:* **1. Flood forecasting 2. Abukuma Rive Japan.**—*G.T.*

**8E–97** 551.509.5:551.579.4(521.77):551.482.

Uchida, Y., **Forecast of river water level by using precipitation amount.** *Journal of Meteorological Research*, Tokyo, 4(9):613–615, Feb. **1953.** 2 figs. In Japanese; English summary p. (38) **DWB**—A method of unit hydrograph is applied to the forecasting of water level of the Sendai Rive Tottori Prefecture. The form of the unit hydrograph is determined from observed data of a intense rainfall of short duration. Rain is computed for each 4-hour interval and 2-hour values o runoff are obtained. A graph is prepared from which stage levels can be read for various runo amounts. Two practical examples are shown. Calculated values of runoff are compared wit those observed, with close agreement. *Subject Headings:* **1. Hydrologic forecasting 2. Unit hy drographs 3. Sendai River, Japan.**—*From author's abstract.*

**8E–98** 551.509.58:551.579.

Umeda, Saburo, **Floods owing to melting snow in Akita Prefecture—an investigation int fundamentals of snow flood forecast.** *North-East Japan Researches*, 2(1):17–21, Feb. **1952.** 3 fig In Japanese; English summary p. 55. **DWB**—In order to obtain basic data for the snow floo forecast in Akita Prefecture, the writer has investigated the floods due to melting snow. The item analyzed are as follows: (a) Changes in the quantity of water in different seasons. (b) The time of the year when high water levels are recorded. (c) The amount of snow and the frequency of hig water levels recorded. (d) The amount of rainfall that causes high water level. (e) Relation between the quantity of water and the amount of rainfall plus the snow melted. *Subject Heading* **1. Flood forecasting 2. Snow melt 3. Akita Prefecture, Japan.**—*From author's abstract.*

**8E–99** 551.509.5:551.57

Vogl, Kurt (*Berlin*), **A rövid időre szóló hidrológiai előrejelzések és pontosságuk.** [Short range hydrological forecasts and their accuracy.] *Idojárás*, Budapest, 60(2):65–71, March/Apr **1956.** tables, 14 refs. Russian and English summaries p. 65. German version p. I–V. **DLC** Reviewing the methods and results of hydrological forecasting the author finds that because of th continuous variations in runoff conditions and in the amount and quality of suspended matter in given sector of a river, the reliability of short-range forecasts will always remain rather limite The usefulness of meteorological forecasts for such purposes depends on whether or not unusu precipitation can be predicted 24 or 48 hours in advance. *Subject Headings:* **1. Hydrologic fore casting 2. Short range forecasting.**—*Author's abstract.*

**8E–100** 551.509.58:551.579.

Wallner, Josef, **Die Hochwasservoraussage.** [Flood forecasting.] Berlin, Julius Springe **1938.** 65 p. 40 figs., 26 refs. Abstracted from photostat. **DWB**—Flood forecasting metho used in Germany, based on (1) the weather situation, (2) precipitation measurements over a flo plain or unit hydrographs (taking into account snow, thaw and frozen ground), and (3) river ga measurements and (4) hydrologic balance are outlined and illustrated. Hydrological metho (graphical and statistical) are treated in great detail, with examples from Rhine, Danube, Oder, En and other basins of Germany or Austria. *Subject Headings:* **1. Flood forecasting techniques 2. Ge many.**—*M.R.*

**8E–101** 551.509.58:551.579

Wallner, Josef, **Die Hochwasservorhersage aus Niederschlägen am Obermain.** [Flood for casting from precipitation on the upper Main.] *Deutsches Gewässerkundliches Jahrbuch, Besonde Mitteilungen*, Koblenz, No. 12:109, **1955. DWB**—Preliminary note reporting a method of flo forecasting worked out for the Main river at Bamberg. Initial precipitation and discharge valu are first used for determining combined effects of variable factors like vegetation, soil permeabilit etc. From the runoff factor thus determined, and from subsequent areal precipitation amounts, t magnitude of the flood is predicted. *Subject Headings:* **1. Flood forecasting 2. Main River, Ge many.**—*G.T.*

8E–102 551.509.5:551.579:551.578.46

*Work, Robert A., Wilm, H. G., and Nelson, Morlan W., **Use of snow surveys in planning gulation of Columbia River floods.** *Western Snow conference, 19th Annual Meeting, April 1951, oceedings.* p. 1–27. charts, 6 tables, eqs., 7 refs. **DWB**—Predictions of volume yield and od discharges in the Columbia River are made starting early in April, from snow survey data. rly in May the forecasts are refined by including precipitation data for April or April and May. ius the forecasts become more and more exact as the season advances. Flow volumes and flood scharges for 1879–1950 are given in detail for each month of each year. Regression equations d other data entering into forecasts are given. Sample forecasts and procedure also included. *bject Headings:* **1. Hydrologic forecasting 2. Snow surveys 3. Columbia River.**—*M.R.*

8E–103 551.509.58:551.579.4

Work, Robert A. (*Snow Survey Proj. Super., Soil Cons. Ser.*). **Stream-flow forecasting from snow rveys.** *U. S. Soil Conservation Service, Circular,* No. 914, March **1953.** 16 p. 7 figs. **DA**— is shown for several rivers in the Columbia River Basin that a close relationship exists between e snow-water equivalent, as determined by snow sources, and the spring runoff volume, as well between the latter and the peak discharge. A general description of snow sampling is given and e economical benefit of stream flow forecasting in a coordinated flood-control program is outlined. *bject Headings:* **1. Snow melt runoff 2. Flood forecasting 3. Columbia River Basin.**—*A.A.*

## OCEAN WAVES, SEA ICE, SEA TEMPERATURE

8E–104 551.509.5:551.311.18

Armstrong, Terence (*Scott Polar Research Inst., Cambridge, Eng.*), **Sea ice studies.** *Arctic,* ontreal, 7(3/4):201–205, **1954.** 15 refs. **DLC**—The research on sea ice carried out in the polar gions during the past two or three decades by investigators in various parts of the world is sumarized briefly. The discussion includes the research concerned with the characteristics of ice ucture and behavior, terminology and method of transmission of information on ice observations d ice forecasting. *Subject Headings:* **1. Sea ice research 2. Sea ice forecasting.**—*I.L.D.*

8E–105 551.509.5:532.59:551.46

Balint, E. (*Melbourne Tech. College*), **Wave action on hydraulic structures.** *Commonwealth gineer,* Melbourne, 42(7):266–272, Feb. **1955.** 11 figs., 17 refs. **DLC**—Wave forecasting methods veloped at Scripps Institution at La Jolla, Calif., are described, and action of waves, refraction and fraction on coasts and in channels, methods of measuring waves, model experiments with wave nerating equipment and design of structures to resist wave action are covered, with many illustrans and references. *Subject Headings:* **1. Ocean wave forecasting techniques 2. Wave action.** *M.R.*

8E–106 551.509.5:532.59

Bretschneider, Charles L., **Revised wave forecasting curves and procedure.** California. Univ. pt. of Engineering, Contract N7on4-29519, Project NR 256-001, Technical Report No. 155–47, ot. **1951.** 28 p. 20 figs., 3 tables, 7 refs. **DWB**—An elaborate but effective empirical method wave forecasting from synoptic meteorological charts has been devised and examples of its use r case of cyclonic storms off the West Coast of the U.S.A. on Oct. 25–27, 1950) worked out in ail. Nomograms for computation of gradient winds, fetch, decay length, height and period of ves, etc. are included and their use demonstrated. The wave forecasting curves contain possibility introducing additional data to that of the Sverdrup-Munk charts. It was found that the wave ght and period at end of decay distance depends on fetch distance and wave height and period end of fetch, as well as on decay distance. *Subject Headings:* **1. Ocean wave forecasting techniques West Coast, U.S.A.**—*M.R.*

8E–107 551.509.5:551.311.18

Corton, Edward L., **Climatology of the ice potential as applied to the Beaufort Sea and adjacent ters.** *U. S. Hydrographic Office, Technical Report,* No. 30, June **1955.** 10 p. 5 figs., 5 refs. **VB**—Ice potential climatology is a technique for presenting ice potential calculations on an areal sis. Methods for drawing climatological charts are described and applied to the Beaufort Sea a. Eight sub-areas are defined with different ice potential and stability characteristics. Apcations to short and long range ice forecasting are indicated. *Subject Headings:* **1. Sea ice forecting 2. Sea ice potential 3. Beaufort Sea.**—*Author's abstract.*

8E–108 551.579.4:551.509.58(822)

Fesquet, Hilda B., **Pronóstico de la fecha de culminación de las crecientes del río Paraná.** orecasting of the date of highest tides in the Paraná River.] *Meteoros,* Buenos Aires, 5(4):345–

362, Oct./Dec. **1955.** 14 figs., table. Spanish and English summaries p. 345. **DWB**—Utilizing th method of multiple correlation for 262 waves of tides, the author has developed a formula for predict ing the time of translation from Posadas to Paraná by combining the hydrometric heights of be ginning and culmination of the wave at Posadas, the hydrometric heights at Corrientes, La Paz an Paraná and the day of culmination at Posadas. In 95% of the cases the error was ±5 days an 89% of the cases only 3 days. The errors are usually caused by rainfall recurring during the transla tion of the waves. *Subject Headings:* **1. Forecasting high tides 2. Paraná River, Argentina.**— *Based on author's abstract.*

**8E–109** 551.509.5:532.59:551.4

Nakano, M. (*Met. Res. Inst.*); Unoki, S. and Kuga, Y. (*Central Met. Observ.*), **On the result o wave observations at Jogashima Island and its application to wave forecasting, Pt. 1.** *Papers i Meteorology and Geophysics*, Tokyo, 4(3/4):115–138, Dec. **1953.** 25 figs., 7 refs. Abstract p. 11 **DWB**—Height and period of wind waves and swells were observed by automatic wave gages and th result classified into six types, compared with meteorological conditions such as the movement o cyclones, and anticyclones in different directions. The instrument is described and records o waves are shown. Forecasting rules are based on wave characteristics versus effective distance o the cyclones. *Subject Headings:* **1. Ocean waves 2. Ocean wave forecasting 3. Jogashim Island, Japan.**—*A.A.*

**8E–110** 551.465:551.509.

*Saville, Thorndike Jr. (*Res. Div., U. S. Beach Erosion Bd.*), **North Atlantic Coast wave statistic hindcast by Bretschneider-Revised Sverdrup-Munk method.** *U. S. Corps of Engineers, Technic Memorandum*, No. 55, Nov. **1954.** 18 p. 6 figs., numerous tables, 12 refs., appends. **DWB** Data on waves are presented in every conceivable graphic and tabular form for 4 stations on th North Atlantic Coast of the U. S.: 1) off Penobscot Bay, Maine; 2) off Nauset Beach, Cape Co Mass.; 3) off New York Harbor and 4) off Chesapeake Bay entrance. Wave characteristics we determined from 6-hourly synoptic weather charts for 3 yrs (1948–50). Wind speeds determine from weather maps were checked against ship reports. Conventional hindcast methods were use Statistics are given *in extenso*. *Subject Headings:* **1. Wave height data 2. Ocean wave hindcastin 3. Windwave relationships 4. Sverdrup-Munk-Bretschneider wave forecast method 5. Nort Atlantic Coast, U.S.A.**—*M.R.*

**8E–111** 551.509.5:551.311.1:551.526

Simojoki, Heikki, **Zur Kenntnis der Abkühlung des Meerwassers und die Bedeutung de Wärmevorrates des Wassers in Bezug auf den Zeitpunkt der Vereisung im Schärenmeer sow am Rande der nördlichen Ostsee.** [The cooling of the sea water and the importance of the he reserve of the water for the beginning of ice formation in the Finnish Archipelago as well as in th coastal waters of the Northern Baltic Sea.] *Fennia, Helsinki*, 73(2), **1950.** 16 p. 6 figs., 5 table **DLC**—The heat balance of the sea water is studied from its summer maximum until it reaches th freezing temperature. Ice forecasts based on the maximum water temperature (given from 192 1947) are unreliable, but temperature deviations in Nov. and Dec. can give certain indications f the beginning of ice formation. *Subject Headings:* **1. Sea ice forecasting 2. Sea temperatur 3. Baltic Sea.**—*A.A.*

**8E–112** 551.509.5:551.311.1

Tabata, Tadashi, **On the prediction as to the last date of disappearance of drift ice at Abashi in the southern Okhotsk Coast of Hokkaido.** *Sapporo, Japan. Hokkaido Univ. Institute of Lo Temperature Science, Low Temperature Science*, No. 9:149–157, **1953.** 5 figs., table, 8 refs. Japanese; English summary p. 157. **DWB**—The long period forecasting as to the last date disappearance of drift ice at Abashiri might be of importance for navigation and the fishery in th district. The author calculated the predicting date using the new method of long period forecasti which has been developed by late K. IMAHORI. The predicted date for 1952 was April 20th, wh the actually observed date was April 28th. The agreement is tolerably good. The author hop it might be further improved by the use of the multiple prediction method in the future. *Subj Headings:* **1. Drift ice 2. Drift ice disappearance forecasting 3. Abashiri, Japan.**—*Author's abstra*

**8E–113** 551.509.5:551.311.

U. S. Hydrographic Office, **Long-range ice outlook: western portion of Project 572 (195 Part 1: Area east of 128 W.** Its *H.O. Misc.* 15869-11, **1955.** 29 p. 21 figs., 3 tables. **DWB** An outlook of sea-ice conditions for the area from Amundsen Gulf to Shepherd Bay is presented f the period mid-June through mid-Aug. 1956. The outlook contains both descriptive and graph interpretations of expected monthly ice conditions for this period. Included are dates most feasib for commencing survey operations for specific points in the area. Additional charts showing es

ated monthly ice conditions for Sept. and Oct. are included for reference. The factors which onstitute the basis of the outlook are also covered. Oceanographic and climatic conditions during he winter 1955–56 are evaluated in terms of ice growth and drift. In addition, observational ice rmation obtained by aerial reconnaissance conducted on April 19 and 20 is presented and compared ith ice conditions for approximately the same period in 1955. In general the outlook indicates hat ice conditions will develop essentially the same as in 1955, with the exception of Amundsen ulf where disintegration is expected to be delayed slightly. In addition, a greater quantity of olar ice is expected in the eastern portion of Queen Maud Gulf in late Aug. and early Sept. *Subject eadings:* **1. Sea ice forecasting 2. Arctic.**—*Author's abstract.*

**8E–114** 551.509.33:551.526.6

*Watanabe, Nobuo and Hirano, Toshiyuki, (*Tokai Regional Fisheries Research Lab., Tokyo*), **n attempt to predict the surface temperature of the North-Eastern Sea adjacent to Japan for the ummer, 1955.** *Oceanographical Society of Japan, Journal,* 11(2):47–55, Aug. **1955.** 8 figs., tables, refs. **DWB**—On the basis of a study of oceanographic conditions east of Japan from 1921, and a pecial statistical study of conditions in 1954–March 1955, the author predicts that the surface emperature of the seas to the east of Northern Honshu and Hokkaido will be below normal, and ast of Central Japan a little higher than or normal. Hence the temperature on the northern coast ould be lower than normal, and in the coastal area south of Shioya-Zaki higher. The prediction hat both the Oyashio and Kuroshio would have a stronger flow than normal is strongly correlated ith the other predicted events. *Subject Headings:* **1. Seasonal forecasts 2. Sea temperature orecasts 3. Japanese seas.**—*M.R.*

## SUPPLEMENTARY MATERIAL

**8E–115** 551.579.4

Grigor'eva, E. N., **O povtoriaemosti vysokikh vesennikh razlivov na rekakh Tyre, Tobole, rtyshe, c 1851 po 1950 g.** [On the frequency of high spring floods on the Tyr, Tobol and Irtysh ivers from 1851 to 1950.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geograf.,* No.1—89–90, Jan./Feb. **956.** fig., 5 refs. **DLC**—A chart shows the frequency and intensity of spring floods on the Irtysh t Tobolsk from 1851–1950. The irregularity of the "cycles" is evident. However, 6 periods of -5 years when waters rose 7–8 m or more occurred in the past 100 years. Long intervals (1868–884, 1930–1940) have occurred without any abnormal (>7 m) spring floods. *Subject Headings:* **. Flood frequencies 2. Tobolsk, U.S.S.R.**—*M.R.*

**8E–116** 551.509.5:551.311.18(268)

Hagglund, M. G., **Formation, properties and forecast of Arctic sea ice.** *Canada. Meteorological Div., Cir.* 2673, Tec. 224, June 28, **1955.** 8 p. 2 figs., table, 5 refs. **DWB**—A brief and general esume of sea ice forecasting methods, applied by the U. S. Navy, Hydrographic Office. This ervice was initiated only after millions of dollars were lost due to ice damages in 1951. An ice rift table shows the speed of ice drift in terms of observed wind, depending on concentration and ummockness of the sea ice. Formation, growth and disintegration of sea ice are discussed. The perational forecasts depend considerably on extended weather forecasts. *Subject Headings:* **. Sea ice forecasting 2. Arctic sea ice. I. U. S. Hydrographic Office.**—*A.* 4.

**8E–117** 551.579.4:551.509.58

Parde, Maurice, **Beziehungen zwischen Niederschlag und Abfluss bei grossen Sommerhoch-assern.** [Relation between precipitation and runoff during high summer floods.] *Bonner Geo-raphische Abhandlungen,* Bonn, No. 15, **1954.** 59 p. 6 figs., table, 38 foot-refs. **DWB, DLC**—n intensive study of summer floods in the Northern Hemisphere with examples from unusual oods in the valleys of the Oder and Danube, the rivers of the Appalachians in S.E. United States Aug. 1945), the Muskingum Valley of Ohio (Aug. 1935), New England (Sept. 1938), the Appenines Aug. 1935), Kansas (July 1951), Texas, France and other countries. The various chapters discuss eneral frequency of summer floods, summer floods that do not equal the greatest winter floods, nd the most notable summer floods, and factors influencing runoff, forecasting summer floods, oefficients of runoff derived from empirical data and examples of calculations. Calculations of ummer floods analyzed here differ form winter and spring floods in that snow melt is not as a rule n important factor—merely precipitation and state of ground. *Subject Headings:* **1. Summer oods 2. Flood forecasting 3. Central Europe 4. Eastern United States.**—*M.R.*

**8E–118** 551.509.5:551.579.4

*Parshin, V. N., **Ispol'zovanie snegomerkykh s''emok v gorakh v tseliakh prognoza stoka gornykh ek.** [The application of snow surveys in mountains to the forecasting of mountain river discharge.]

*Meteorologiia i Gidrologiia*, No. 5:40–44, May **1956.** 3 figs., table. **DWB, DLC**—River discharge is forecast for a mountainous region in the southern part of central Asia for which extensive snow survey data are available and where weather conditions and precipitation for the forecast period do not play a decisive role. *Subject Headings:* **1. River forecasting 2. Snow data 3. Central Asia U.S.S.R.**—*I.L.D.*

**8E–119** 551.509.5:551.579

Pender, E. B.; Walsh, D. T. and Anderson, D., **Hydrology in the Snowy Mountains area.** *Institution of Engineers (of) Australia, Sydney, Journal*, 28(3):51–66, March **1956.** 27 figs. (incl. photos), tables, 11 refs. **DLC**—Characteristic seasonal, secular and long term variations in yield over a basin are defined. The Snowy Mountain area is on the border between the tropical and temperate regions, and gets 5 to 10 times the precipitation recorded at other places in the same latitude. Yield in one year (1917) may be 5 times as much as in another (1938) and in one month 25 times as much as the same month in another year (Oct. 1917 and 1914). Minimum flow is most important characteristic, and it is mainly a function of the meteorology of the catchment. A standard period (1904–52) has been adopted as a basis for design, although this may be in a dry cycle. Mobility of snow and rain shadows produce marked variation within a catchment. This is shown by a graph of water content of snow at 6 stations at 5500–6500 ft elevation. Climate has grown steadily drier for 70 yrs here as in all east portions of continents where precipitation has been 20% higher in 1852–1902 than in 1902–52. Hydrologic forecasting (which includes expected precipitation and temperature conditions), and procedures used in weekly power forecasts; snow surveys, analytical hydrology, flood hydrology, artificial precipitation, etc. are discussed. *Subject Headings:* **1. Hydrologic forecasting 2. Snowy Mountains, Australia.**—*M.R.*

**8E–120** 551.509.5:551.579

Sapozhnikov, V. I., **K metodike prognoza stoka po sootvetstvennym raskhodam.** [Method of forecasting runoff from corresponding river discharges.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:37–38, Feb. **1956.** fig., 2 refs., 5 eqs. **DWB, DLC**—A formula is developed for determining water discharge at any river valve on the basis of data on discharge at contiguous stations and time of flow of water between valve. *Subject Headings:* **1. Runoff forecasting 2. River discharges** —*I.L.D.*

**8E–121** 551.578.46:628.13

Work, Robert A. (*U. S. Soil Conservation Serv.*), **Measuring snow to forecast water supplies.** U. S. Dept. of Agriculture, Water: the Yearbook of Agriculture, 1955:95–102. pub. **1955.** figs. **DA, DWB**—Methods of snow sampling, measurement and data analysis for purpose of seasonal stream flow forecasting and factors which modify the relationship between snow cover and runoff are discussed in this article. *Subject Headings:* **1. Snow measurements 2. Seasonal stream flow forecasts 3. Water resources 4. Western United States.**—*M.R.*

# PART III. REVIEWS, TRANSLATIONS, REPRINTS, ROUTINE PUBLICATIONS, AND ANALYTICS FROM RECENT SERIALS AND COLLECTED WORKS

**Note:** Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

## A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

tlas tipovykh proektov gidrometricheskikh sooruzheniĭ, chast' 1 [Atlas of representative plans of hydrometric structures, Pt. 1]. Leningrad, Gidrometeoizdat, 1952. Review by V. A. Berg in *Meteorologiia i Gidrologiia*, Leningrad, No. 11:52–54, Nov. 1956.

aur, F.: **Physikalisch-Statistische Regeln als Grundlagen für Wetter und Witterungsvorhersagen, I** [Physical-Statistical rules as bases for weather and weather-forecasting, Pt. 1]. Frankfurt a.M., Akademische Verlag, 1956. Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(4):529–531, 1957.

aver, L. D.: **Soil physics.** 3rd ed. N. Y., John Wiley; London, Chapman and Hall, 1956. 489 p. 106 figs., 65 tables. Price, 62 sh. Review by H. L. Penman in *Royal Meteorological Society, Quarterly Journal*, 82(354):549, Oct. 1956. (*For review on the original, see* 8.3–8, March 1957, *MAB*)

oyd, R. L. F.; Seaton, M. J. and Massey, H. S. E., (eds.): **Rocket exploration in the upper atmosphere.** London, Pergamon Press, 1954. 376 p. figs., tables. Price, 75 sh. Review by J. Pepper in *Royal Meteorological Society, Quarterly Journal*, 82(354):546–547, Oct. 1956. (*See* 6.5–9, May 1955, *MAB*)

ull, G. A. and James, D. G.: **Dust in the stratosphere over western Britain on April 3 and 4, 1956.** [In] *Meteorological Magazine*, London, 85(1012):293–297, Oct. 1956. 3 figs., refs. Summary in *Nature*, London, 179(4562):705–706, April 6, 1957. (*See* 8.2–302, Feb. 1957, *MAB*)

ommittee for Compilation of Reports on Research in the Effects of Radioactivity: **Research in the effects and influences of the nuclear bomb test explosions, Pts. 1–2.** Ueno, Tokyo, Japan, Society for the Promotion of Science, 1956. 1823 p. Illus. Price $25.00 from Stechert-Hafner, 31 East 10th St., N. Y. Review by C. A. Mawson; H. B. Newcombe and W. E. Grummitt in *Science*, Wash., D. C., 125(3249):654, April 5, 1957.

ermany. Deutscher Wetterdienst: **Aspirations-Psychrometer-Tafeln** [Aspiration-psychrometer tables]. Brunswick, Vieweg, 1955. 183 p. Price, DM 35. Review in *Geofisica e Meteorologia*, Genoa, 4(1/2):35, Jan./April 1956. Review by E. Pelzl in *Zeitschrift für Meteorologie*, 10(8):253–254, Aug. 1956. (*See* 6.6–52, June 1955, *MAB*)

oldschmidt, V. M.: **Geochemistry.** Ed. by Alex Muir. Clarendon Press, 1954. 730 p. 9 figs., 96 tables. Price 63 sh. Review in *Royal Meteorological Society, Quarterly Journal*, 82(354):547, Oct. 1956.

uss, Ed.: **Kleinraummeteorologische Studien im Federseegebiet in Strahlungsnächten** [Micrometeorological studies in the Federsee region on radiation nights]. [In] *Archiv fur Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(4):329–352, 1955. 13 figs., 7 refs. Review in *Meteorologické Zprávy*, Prague, 9(3):84, 1956. (*See* 7.3–260, March 1956, *MAB*)

endrew, W. G. and Currie, B. W.: **Climate of Central Canada.** Toronto, Meteorological Div., Dept. of Transport, 1955. 194 p. figs. Price $1.00. Review by H. D. Hoyle in *Meteorological Magazine*, London, 86(1017):89–90, March 1957. (*See* 8.1–14, Jan. 1957, *MAB*)

noch, Karl and Schulz, Alfred: **Methoden der Klimaklassifikation** [Method of climatic classification]. *Petermanns Geographische Mitteilungen, Ergänzungsheft*, No. 249, 1952. 78 p. figs., tables, maps, bibliog. of 314 refs. Review by H. Lautensach in *Petermanns Geographische Mitteilungen*, 98(3):198–200, 1954. (*See* 6.10–11, Oct. 1955, *MAB*)

uiper, Gerard P. (ed.): **The earth as a planet.** Chicago, Univ. of Chicago Press, 1954. 751 p. figs., tables, photos, bibliogs. throughout. Review by Arthur Holmes in *Nature*, 179(4555):334–335, Feb. 16, 1957. Review by G. D. Robinson in *Meteorological Magazine*, London, 85(1011):284–285, Sept. 1956. (*See* 7.11–4, Nov. 1956, *MAB*)

Milne-Thomson, L. M.: **Theoretical hydrodynamics.** 3rd ed. London, Macmillan, 1955. 632 p. figs., tables. Price, 60 sh. Review by R. S. Scorer in *Royal Meteorological Society, Quarterly Journal*, 82(353):379, July 1956.

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